TROUBLE AT MACH 1

# FLYING

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and the

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JULY, 1956
35 CENTS
to U. S. and Canada

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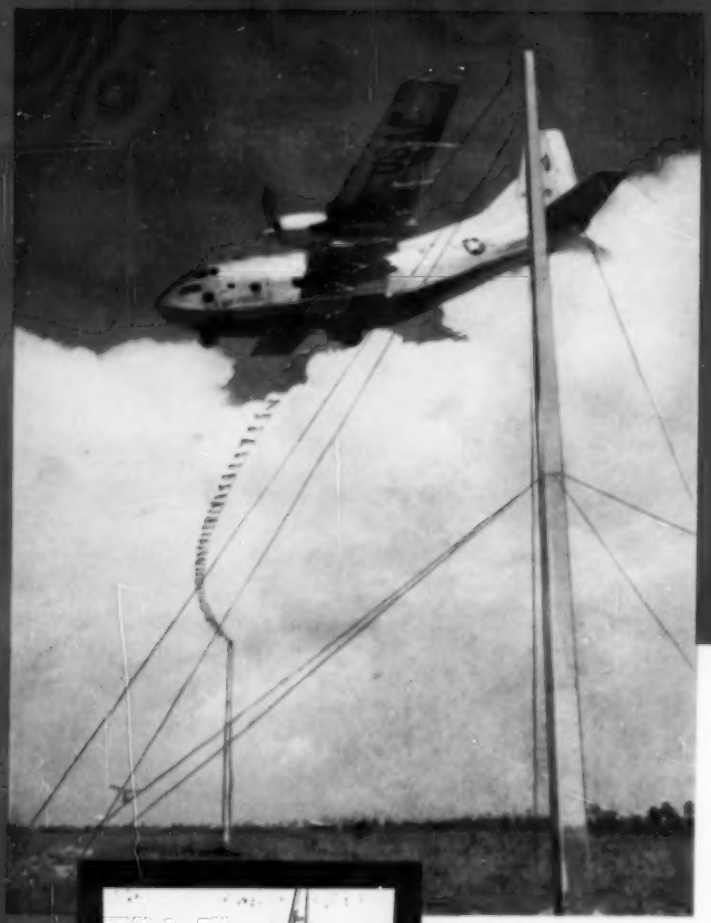

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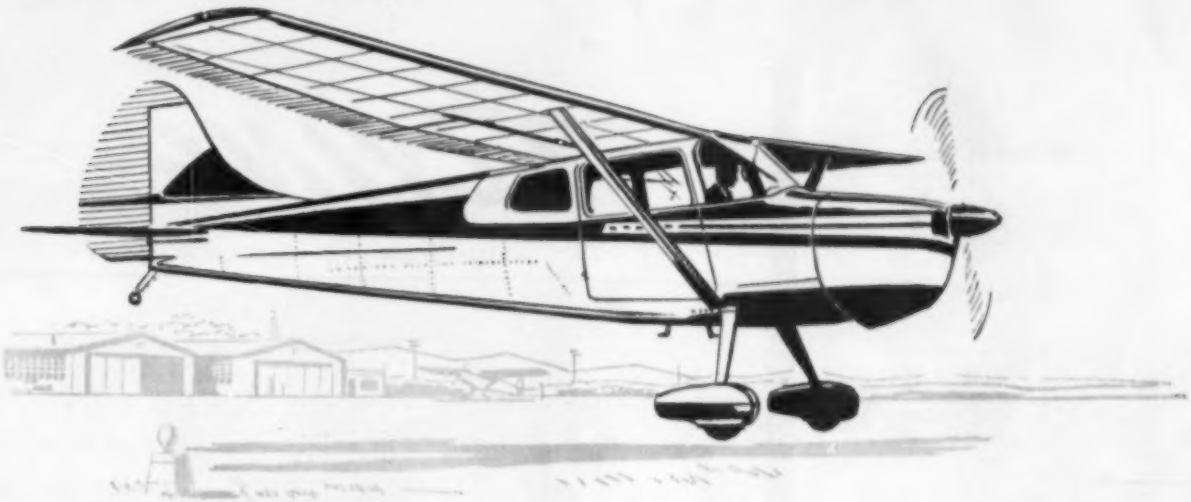

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JULY, 1956 VOLUME 59, NUMBER 1

# FLYING

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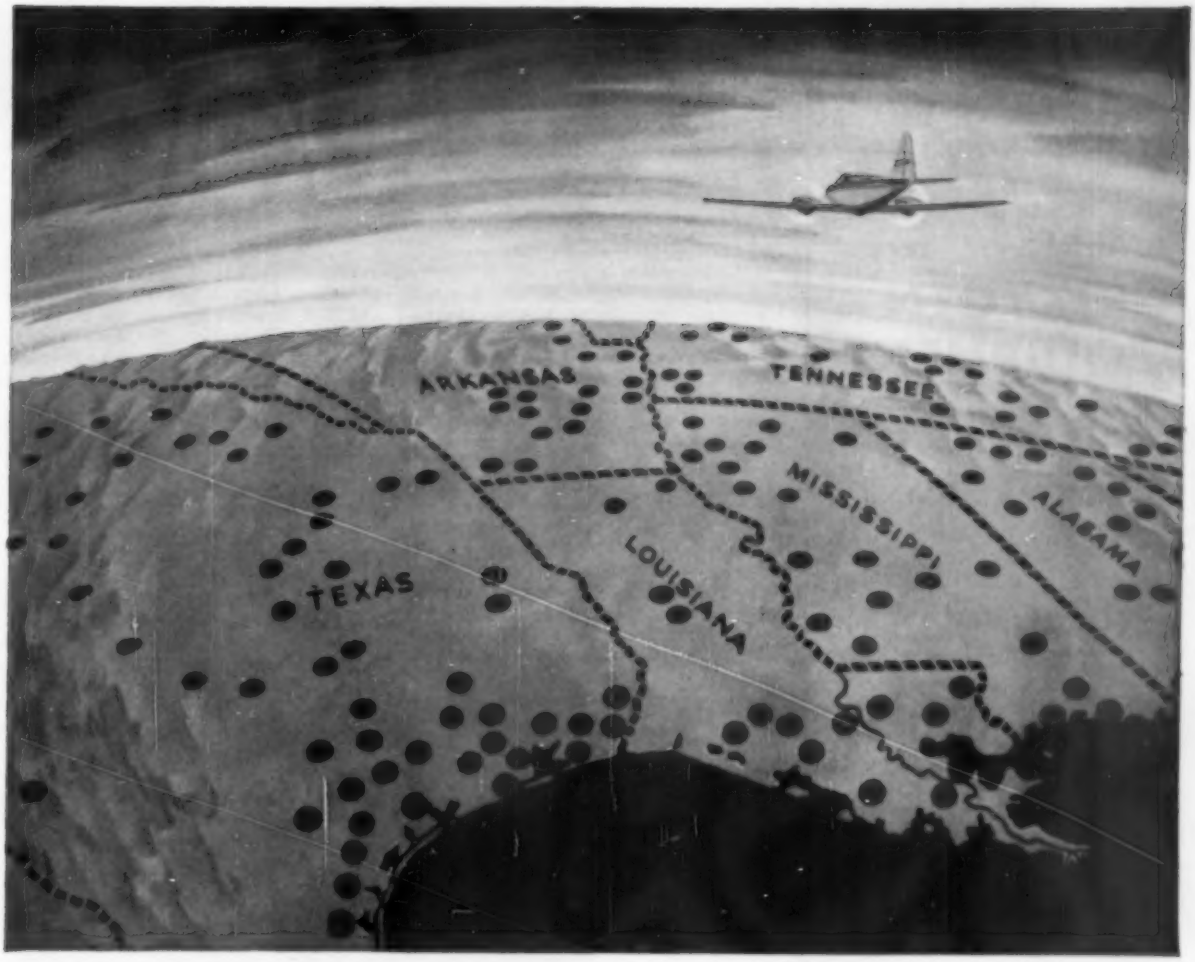
THE COVER: Maxwell W. Balfour, Director of Spartan School of Aeronautics. For more on this famed figure in aviation, read "Spartan of Tulsa" on page 22.

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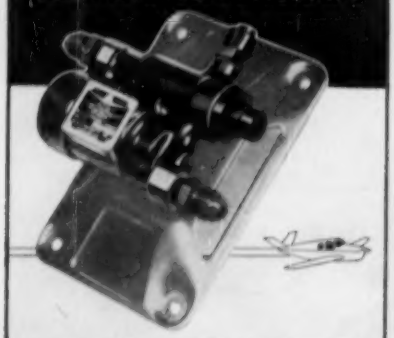

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# MAILBOX

### THE AIRMAN'S WORLD

One of my patients recently asked, "Just what do you enjoy in flying?" I read him your "Airman's World" from the May issue. He was quiet for a moment afterward, then said, "Now I really understand what you experience in the sky."

The moist palm, the sun slithering through a hole in the clouds ahead, the tight feeling of the stomach as one races a front to a safe airport—all these sensations are foreign except to us who know the real majesty of God's creation. Your writing smacks of the feeling behind Pilot Officer Magee's poem in World War II . . . "soaring the skies on laughter silvered wings, sunward I've climbed, and done a million things you have not dreamed of. Hovering there I've chased the shouting wind along, and flung my craft through footless halls of air." Such poetry is for us to understand.

DR. G. R. HALL

Clawson, Mich.

. . . The latest essay of the Airman's World in the May issue is beautiful . . . Sometimes I have wondered when I was flying if it was worth it all. Now I'm sure it is.

THOMAS L. BYRNE

Hawthorne, Calif.

. . . You have put in words what I have always thought was not susceptible to expression in mere language.

LLOYD FLETCHER

Washington, D. C.

. . . Your "Airman's World" is such a beautiful piece of writing that we are wondering if it would be possible to obtain a copy suitable for framing. It is something I would like to have hung over my desk in the office to see each time I return from a flight.

J. COLES HEGEMAN

Providence, R. I.

● *We regret very much that we have been unable to supply all the requests we have had for copies of the Airman's World. Ultimately the series will be published in book form.*—ED.

### PICTURES NEEDED

Our Service Club here at Webb Air Force Base is planning to sponsor in the near future a "Name That Plane Contest" for all Base personnel. Because of our location in southwest Texas, entertainment is at a premium and we feel that our contest will attract much attention. We would like to know if you can tell us where we might obtain authentic pictures of various types of aircraft, both foreign and U. S. In order to make the contest as interesting as possible, we would like to have as many pictures as we can secure. The size of the pictures is not important as they will be displayed on large mats.

MARY JANE TWINE
Club Director
John H. Lees Service Club
Webb Air Force Base
Big Spring, Texas

### "WE MUST FLY TO FREEDOM"

The editorial in the May issue, "We Must Fly to Freedom," is so potent and so aptly describes the gravity of the matter it entreats that my copy went off to my Congressman asking his careful perusal and the action it most surely deems obvious.

KENNETH J. WOODS

East Prairie, Mo.

. . . I don't believe you left any stones unturned on the status of civil flight training in this country. . . . The Federal government dropped the ball while the G.I. training program was going full blast after World War II. There were several thousand pilots graduated at the time but the cost of purchasing a plane to fill a family's need was beyond their means. This would have been an opportune time for an aircraft manufacturer to market a four place and a nice trainer at a reasonable cost. If this cost was prohibitive for a manufacturer to undertake, the government could have subsidized the project. Such a project would have returned more to our well being than some of our foreign aid programs. (I haven't eaten any of those Point-4 peanuts from Africa yet.)

HAROLD W. RICHARDS

Clovis, N.M.

. . . I do not think that the solution to mass flying is a cheap airplane. While more than a hundred of us in our flying club have enjoyed flying as a group for the past 19 years, not a single one of us individually could afford to fly very long even if you were to give each one of us an airplane. The fixed costs are too high!

The fixed cost per individual in our club for a Cessna 140, an Aeronca *Champion*, a Piper *Clipper*, modern all-metal hangar, clubroom and all facilities is two cents less per week than a package (not a carton) of cigarettes. For this dollar a month, each member also gets one free hour of flying in the Aeronca or its equivalent in the Cessna or Piper.

From this it is plain to see that to "fly to freedom" we must group together!

*(Continued on page 8)*

*Try the airplane that makes flying like driving*

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## MAILBOX

*(Continued from page 6)*

However, group or club flying requires the same efficient training and careful operation as any other branch of aviation. What the country needs is an educational program in group flying.

ERWIN E. STOCKWELL

Orange, Mass.

. . . As a flying club, which we feel in many respects to be the backbone of private flying in this country, we have taken great pleasure in the editorial policy of your magazine. We are a relatively young organization. Nevertheless, we have been moved to considerable discussion by your editorial policy. Consequently our group has resolved to take the necessary action to solicit the interest of the youth in this area. . . . The answer, we feel, is gliders which offer the finest training in flight techniques. By this means we can offer flight training to youth at approximately one third the cost of powered flight. We feel by this means our club can offer something concrete to the youth training program and the whetting of their appetites for flying.

R. W. GRAHAM
Manicoas Flying Club

Minneapolis, Minn.

. . . You summed up the problem accurately in your editorial by stating youth must "get into the air." As a high school teacher and pilot, I believe this can be done best through the school where most young people spend a great percentage of time. But definite preparatory work would have to be taken to attain this. . . . I have been told students are not interested when I wanted to introduce aviation courses in high schools. Naturally they're not interested about something concerning which they are ignorant. I believe the only way school leaders can be roused to provide aviation training will be when students' and parents' interest is sufficiently stirred to demand courses in school.

MRS. MARIE HUBERT

Haines City, Fla.

. . . The County Board of Education here in Marion County, Fla., has an aircraft mechanics and flight training program for its high school students. . . . A student can become a private or commercial pilot by the time he finishes his high school education. The school furnishes four planes—three *Cub* trainers and one Globe *Swift*. The cost to the students is only $2 per flying hour, I am informed. I think more boys would become interested in flying if other high schools over the country would provide such courses.

JOE MORROW

Ocala, Fla.

. . . The enormous increase in opportunity for each young person today has forced aviation, as it has all other walks of life, to compete for the vocational interest of youth. Aviation possibly has relied too much on its old aura of glamour to carry its message, rather than deliberately plan an effective campaign to attract youngsters. Reliance on the military phase of aviation to spread the message of air-mindedness has been, and will be, in times of peace, a serious mistake and result only in abject failure.

JOHN T. FLYNN, M.D.

New York, N. Y.

**SUPERSONIC PHOTO**

In the May issue you showed a picture of the Missouri River taken by an RF-101A *Voodoo* at 45,000 feet, together with an enlarged section of the photo which you asked if we could locate in the main picture. I am curious to know if I have spotted the section that was enlarged.

J. T. Mann

Tahlequah, Okla.

● *You picked the spot correctly, Mr. Mann, and for other readers who may have tried to locate it, here is the picture with the spot circled in white.*—ED.

Don Vest, Vest Aircraft & Finance Co., P. O. Box 5306, Sky Ranch Airport, Denver, Colorado.

Gene Hudman, Stonnell and Holladay Aircraft Sales, Carolina Division, Municipal Airport, Charlotte, N. Carolina.

Peter Graves, Southern Ohio Aviation Sales Co., Dayton Municipal Airport, Vandalia, Ohio.

John Wilsdon, Hunter Aviation Co., P. O. Box 122, Lambert Field, St. Louis, Missouri.

Victor "Vic" Bruce, Indianapolis Executive Aircraft Corp., Indianapolis Municipal Airport, Indianapolis, Indiana.

H. Warren Holladay, Stonnell and Holladay, 843 Washington Building, Arlington Towers, Arlington, Virginia.

Norman Hoffman, West Texas Flying Service, Midland Airport, Box 82, Midland, Texas.

Art Meurer, Arthur Meurer Co., Inc., LaGuardia Field, New York, N. Y.

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Robert F. Wood, Newport Air Park, Newport, Rhode Island.

H. Leibee Wheeler, Buffalo Aeronautical Corperation, Buffalo Municipal Airport, Buffalo, New York.

A. M. "Sime" Bartolet, Reading Aviation Service, Inc., Municipal Airport, Reading, Pennsylvania.

Max R. Brand, Aero Commander Dist. (Downtown Airpark), Hanger 3, Municipal Airport, Tulsa, Oklahoma.

E. H. "Ted" Tolan, National Aero Sales Corp., Midway Airport, Chicago, Illinois.

Dale Rapp, Jr., Aero Southern Corp., 601 Broadway, Nashville, Tennessee.

W. H. "Bill" Buchanan, Sales Manager, Johnson Air Interests, Inc., Horlick-Racine Airport, Racine, Wisconsin.

Louis Humphreville, Executive Aircraft Corporation, Municipal Airport, Pontiac, Michigan.

L. S. McIntire, West-Livingston Aircraft, Inc., International Terminal Building, International Airport, Oakland, California.

John A. "Jack" Bauman, Santa Monica Aviation, 3011 Airport Avenue, Municipal Airport, Santa Monica, Calif.

Herrol Bellamy, L. B. Smith Aircraft Corp., Miami International Airport, Miami, Florida.

Lucien M. Taillac, Trans-Aire Corporation, Pan-Air Building, New Orleans Airport, New Orleans, Louisiana.

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## FLYING CALENDAR

**June 21-22**—Aviation Distributers and Manufacturers 27th annual meeting at Grove Park Inn, Asheville, N. C. Directors and committees meeting June 20.

**June 23, 24**—Porterville Pilots Area Ass'n. 9th Annual Moonlight Flight. Wiener roast, dancing, entertainment free to all who fly in. Lighted field, 5,000' & 6,000' runways, control twr. Write: PAPA, 1110 Mill St., Porterville, Calif.

**June 24**—3d Annual ranch-style, Fly-in Breakfast, sponsored by the Bluffton Flying Club at Bluffton Airport, Bluffton, Ohio.

**July 1**—Annual Grand Haven Dawn Patrol, Grand Haven Memorial Air Park, Grand Haven, Mich.

**July 7-10**—Tenth Annual All-Women Transcontinental Air Race from San Mateo Cy. Airport, San Carlos, Calif., to Bishop Airport, Flint, Mich. For details, contact: Betty Loufek, Director, Public Relations, AWTAR, Inc., 5316 Carita St., Long Beach 8, Calif.

**July 8**—Third Annual Western New York Air Show and Races at Niagara Falls Municipal Airport, Niagara Falls, N. Y.

**July 8-15**—Philadelphia Glider Council annual open house week at Phila. Gliderport, Hilltown, Penna. Soaring Pilots' Flying Vacation—Aero Tows.

**July 21-Aug. 5**—National Soaring Meet of Canada at Cap de la Madeleine, P. Q., under sponsorship of St. Maurice Aero Club (formerly RCAF Aero Club, Inc.).

**July 22**—Bellingham Air Show sponsored by Bellingham Chamber of Com. Bellingham, Washington.

**July 22**—4th Annual Fly-in Breakfast sponsored by Pottstown unit, AOPA at Pottstown Airport, Limerick, Pa. Rain date: July 29.

**July 28, 29**—Port Townsend Fly-in Feasts, Tours, Boating, fun galore. Port Townsend, Washington.

**July 28-Aug. 2**—1st National Flying Clubs convention, Seattle, Wash. Washington State Av'n Ass'n. will be host to 600 private planes participating in special events, safety conferences and mass flight over Seattle. For details write: Nat'l Flying Clubs Convention, Box 6, South Annex, Boeing Field, Seattle 8, Wash.

**July 29**—7th Annual Trophy Race, Lunken Airport, Cincinnati, O. Write: Margaret L. Berning, Greater Cincinnati Airmen, Inc., Adm. Bldg., Lunken Airport, Cinti 26, O.

**July 29**—2d annual Air Fair sponsored by Portland (Ore.) Jr. Ch. of Commerce at Portland International Airport.

**July 31-Aug. 9**—23rd National Soaring Contest at Grand Prairie, Tex., sponsored by Texas Soaring Ass'n., under auspices of Soaring Soc. of America.

**Aug. 1-5**—Air Force Association annual convention, New Orleans, La.

**Aug. 3-5**—Fourth Annual Fly-in of the Experimental Aircraft Ass'n., Oshkosh, Wisc. Steve Wittman, host. Write: EAA, 3081 S. 56th St., Milwaukee, Wis.

**Aug. 12**—Fly-in free Trout Breakfast at Livingston (Mont.) Airport sponsored by Montana Pilots' Assoc. Prize of $1,000 for largest Rainbow Trout caught.

**Sept. 1-3**—National Aircraft Show sponsored by Oklahoma City Ch. of Com. and the Air Foundation of Cleveland at Will Rogers Field, Oklahoma City, Okla.

**Sept. 12-15**—New York/London/Johannesburg International Air Race, starting from Floyd Bennett Field, Brooklyn, N. Y., and a second International Air Race from England to Johannesburg, South Africa. Total prize money £75,000 or approximately $210,000. Closing date for entry, Aug. 13. For details, write: Royal Aero Club, London, England or National Aeronautics Association, Washington, D. C.

**Sept. 15, 16**—2d Annual Flying Fair sponsored by the Lazy Eight Flying Club at Yuba Cy. Airport, Marysville, Calif.

**Oct. 8-10**—Second Annual Symposium on Aeronautical Communications sponsored by the Institute of Radio Engineers, Professional Group on Communications Systems at Hotel Utica, N. Y.

**Oct. 17-19**—Annual Indiana Aviation Conference sponsored by Ind. ATA and Ind. Airport Officials in conjunction with State Aero. Commission at Turkey Run State Park, Ind.

**Oct. 24-26**—Ninth annual meeting of National Business Aircraft Ass'n, Miami, Fla.

---

Calendar items must be received at FLYING's editorial offices, 366 Madison Ave., New York 17, N. Y., three months prior to the event.

As flight systems have become more complex, speeds higher, space and weight-saving more valuable, the increasing rate of technical progress in the aircraft industry has created a serious problem:

Keeping its products up to top level of operational effectiveness—and in the air—has become a major responsibility of the prime contractor.

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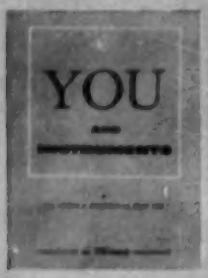
**MARTIN**

# Briefings . . .

NOW AVAILABLE in pocket-size book form, "You and Instruments" was a two-part series in FLYING magazine last year. Written by Col. Joseph B. Duckworth, it presents in simple form the minimum sound information necessary to enable the non-instrument pilot to acquire for himself the ability to handle unsought instrument flight emergencies. Price is 50 cents per copy. Address: Book Editor, FLYING, 366 Madison Ave., New York 17, N. Y.




RAPID DEVELOPMENTS in the field of atom-powered aircraft become increasingly evident with the news that Convair has been awarded a USAF contract to develop an airframe for a nuclear-powered plane and that Lockheed is starting a giant nuclear aircraft testing and research facility near Dawsonville, Ga., where some 500 scientists and technicians will be employed. At the same time news comes from England that Rolls-Royce has been working on an atomic engine for aircraft for the past 18 months.

CALIFORNIA AVIATION SERVICE, INC., Oakland, Calif., is the new Cessna distributor for northern California and western Nevada. Lee Renshaw, who until recently was divisional manager of sales for Cessna, has joined California Aviation in the capacity of vice president.

BY-PASS JET ENGINES usually are thought of as being exceptionally large and powerful. It is therefore particularly interesting to note that the French experimental power plant, the *Aspin II*, is a light weight by-pass jet of only 573 pounds thrust.

CELEBRATING the 10th Anniversary of Strategic Air Command, a decade of security through global air power, SAC Commander Gen. Curtis E. LeMay used the saber of the late Gen. Billy Mitchell

to slice a huge birthday cake. General Mitchell, who envisioned a strategic air service such as SAC 30 years ago, died ten years before SAC became a reality.

THE INTERNATIONALLY famous Krupp interests of Essen, Germany, have taken delivery of a *Learstar* Mk. I transport for business travel. Ferried from the Lear plant at Santa Monica, Calif., to Essen, the plane made stops at New York, Goose Bay and Keflavik, and averaged 274 mph for the 7,300 miles.

MARKING A PRODUCTION RECORD for twin-engine executive aircraft deliveries, Piper Aircraft saw its 500th *Apache* fly off for delivery to the Able Supply Co., of Houston, Tex. Only two years ago, the first *Apache* left the assembly line. New facilities at the Piper plant have upped production to two per day.

THIS OLD BUILDING, established by an Act of Congress in 1800 for registration and sale of public lands for the great Northwest Territory, today serves as a unique observation post for the Ground Observer

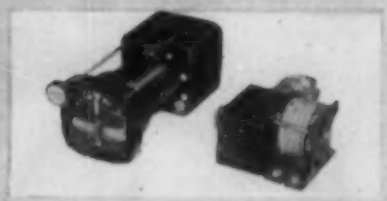
Corps of Wintersville, Ohio. The large bell is from the first courthouse in Jefferson County, Ohio, and served as the warning system of the settlers against Confederate Cavalry raiders of General John H. Morgan in the Civil War.

TRANSISTORIZED INTERCOM, designed for student-instructor communication in light aircraft where noise level is high, has been introduced to the market by the Goldak Co. of Glendale, Calif. Appropriately named "Plane Talk," the intercom is housed in a laminated-phenolic tube 6½ in. long and 1 in. in diameter. It consists of a high-gain, low-impedance microphone and sensitive rubber-cushioned earphones. Its price is in the $25 to $35 retail bracket.

INVESTIGATION of a recent tragic accident revealed that flicker vertigo from dual rotating beacons on the airplane, reflecting in the overcast, was a contributing factor. Turn off your rotary beacons before entering overcast. Full details on this subject can be found in CAA's Safety Release No. 401.

ADDING NEW FLEXIBILITY to business and vacation trips Avis Rent-A-Car-System in cooperation with 21 leading airlines has introduced a "Fly and Drive Ticket." By paying $10 extra on purchase of an air ticket, the traveller receives a special ticket which entitles him to the use of a new Avis car at his destination for a full day and 50 miles of driving.

THE DART I Automatic Rudder Control is now available at all Air Associates aviation supplies offices. Weighing less than three pounds, the Dart I operates off



the turn-and-bank indicator to control direction and rate of turn of the aircraft by automatic operation of the rudder. Price including installation kit is $495. A free booklet describing the equipment is available from Air Associates Inc., 61 Industrial Ave., Teterboro, N. J.

LOPEZ-GRACE AVIATION INC., newly organized aircraft service and sales agency, with main offices at Miami International Airport and a branch facility at Broward County International Airport, Ft. Lauderdale, has been named Florida distributor for Beech Aircraft. Florida Airmotive Inc., certified Beechcraft service, will continue at Lantana, Fla., as the authorized Beechcraft dealer in that area.

AUSTRIA'S FIRST AIRLINE since 1938 will begin operation this summer. Using DC-6B's and Convair *Metropolitans*, with technical assistance furnished by Scandinavian Airlines, initial flights will link Vienna with Rome, Zurich, London, Frankfurt, Copenhagen and Oslo.

TO PROVIDE REPLACEMENTS for CAA controllers who have been or will be assigned to RAPCON (Radar Approach Control) at USAF centers, the CAA has launched a program to recruit and train 300 air traffic controllers. Trainees selected must have either two-and-one-half years experience as a dispatcher in ATC, three years in air, ground communications or be pilots with instrument ratings and 400 hours flying time.

BITTEN BY THE AVIATION BUG, Mr. and Mrs. Bill Jones of Albuquerque, N. M., bought a Piper *Tri-Pacer* last fall,

then both took flight instruction. Both soloed in eight hours. As we went to press Mr. Jones was about to take his private pilot examination and Mrs. Jones was nearing hers and they were awaiting

*(Continued on page 98)*

# FLY WEATHER-WISE

These weather items prepared in consultation with the United States Weather Bureau

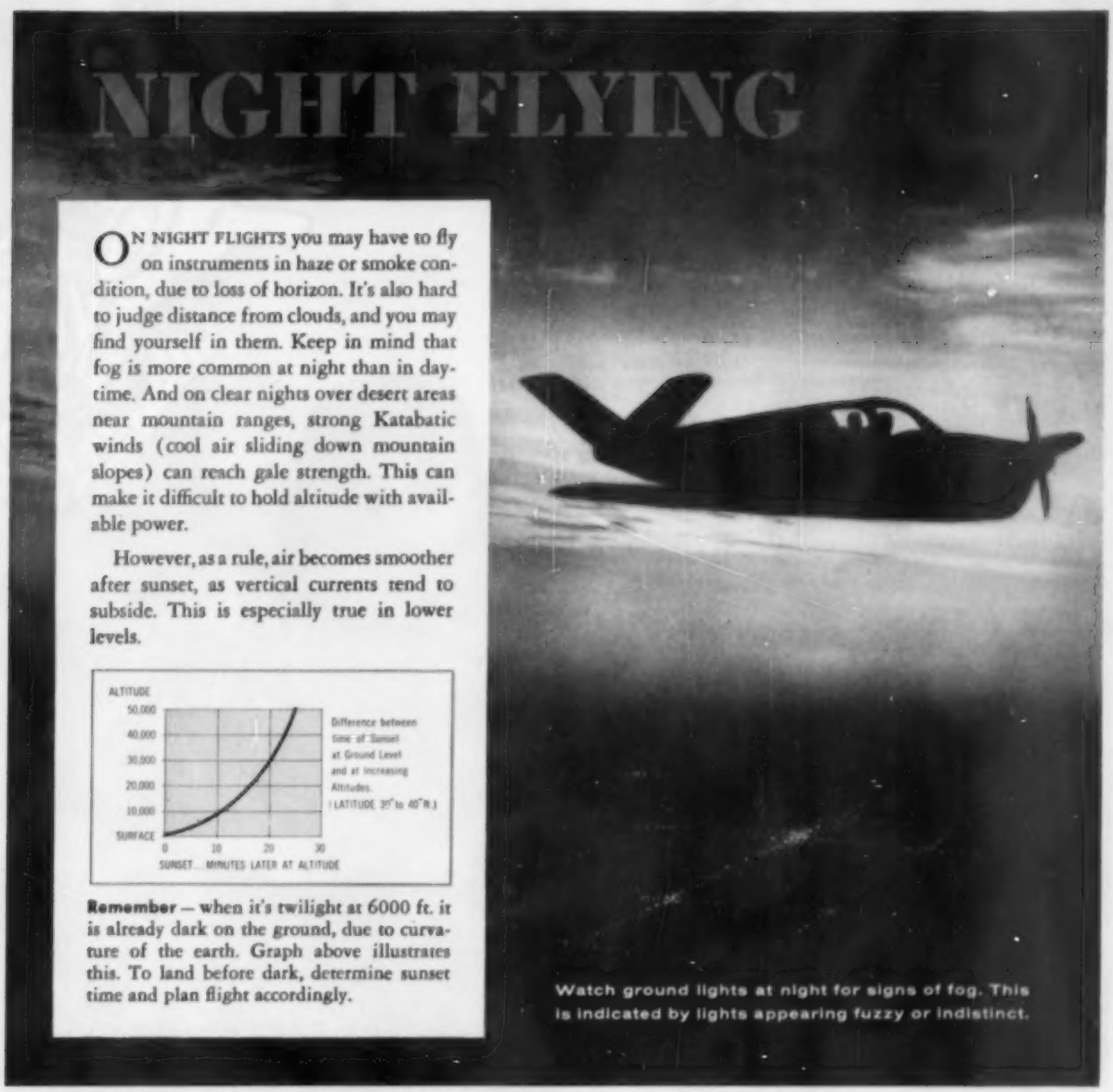
## NIGHT FLYING

ON NIGHT FLIGHTS you may have to fly on instruments in haze or smoke condition, due to loss of horizon. It's also hard to judge distance from clouds, and you may find yourself in them. Keep in mind that fog is more common at night than in daytime. And on clear nights over desert areas near mountain ranges, strong Katabatic winds (cool air sliding down mountain slopes) can reach gale strength. This can make it difficult to hold altitude with available power.

However, as a rule, air becomes smoother after sunset, as vertical currents tend to subside. This is especially true in lower levels.




**Remember** — when it's twilight at 6000 ft. it is already dark on the ground, due to curvature of the earth. Graph above illustrates this. To land before dark, determine sunset time and plan flight accordingly.



Watch ground lights at night for signs of fog. This is indicated by lights appearing fuzzy or indistinct.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Be an ensign in 4 months. The new AOC Program for college graduates, 19 to 26, puts you through 14 months of flight training as an ensign at $438.58 a month.

As a Naval aviator you will travel the world on one of the Navy's new supercarriers, or the newly modernized carriers with angled decks and steam catapults.

New F9F-8T Cougar, a two-seat transition fighter for carrier operations and supersonic flight, is a modified version of the Grumman F9F-8 Cougar, standard Navy jet fighter.

# DILBERT NEVER HAD IT THIS GOOD

College graduates who join the new Navy Aviation Officer Candidate Program really have it made. Instead of going through flight schools as cadets, kept single by regulations, they are made ensigns after 4 months of preflight school. For the next 14 months, until they get their wings, they earn $438.58 a month, more if married.

Dilbert never had it that good.

Come to think of it, many a civilian doesn't have it as good either. Figure the retirement pay these ensigns will draw after a mere 20 years. Even if they never get a promotion (impossible, since ensigns make "jg" in 18 months) they'll get $280.00 a month for life. To get the same, you would have to pay $35.00 a month for 20-years worth of $80,000 endowment insurance.

As for travel, glance at George in the picture taken in Jamaica, B.W.I. Still single and only 26, George has already been to London, Paris, Madrid, the French and Italian Rivieras, Rome, Hong Kong, and Tokyo.

You get all these benefits and more, plus a $70,000 training to become a professional pilot. In return you will be doing your country a service. For details about AOC and NavCad (only 2 years of college required) write: NavCad, Washington 25, D.C.

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The Grumman F11F-1 Tiger is a slick new jet fighter capable of supersonic speeds in level flight and was the first airplane to fly with the new Area Rule "Coke bottle" fuselage.

The Grumman twin-engine S2F sub-killer, along with the carriers and destroyers, make up the Hunter-Killer Group, the Navy counter weapon against submarines.

Designers and builders of the supersonic F11F-1 Tiger, transonic F9F-8 Cougar, S2F sub-killer, SA-16 Albatross rescue amphibian, metal boats, and Aerobilt truck bodies.

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**Aircraft Engine** service, overhaul, modification, replacement

**Propeller** service, overhaul, modification, replacement

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# HANGAR FLYING

## DEVIATING DUCK

THE TELEGRAM reached our Sudan headquarters at Malakal during Saturday lunch. It tersely stated that a missionary at Akobo was very ill and asked us to pick up the Mission doctor at Nasir and fly him to Akobo as quickly as possible. This was clearly a job for the *Pacer* and, with good weather, off I went.

Nasir is 118 miles east of Malakal along the Sobat river—easy navigation. The doctor was speedily picked up and the half hour hop southward to Akobo began. This route more or less follows the line of the Akobo river, but there are swamps and deviations and tributaries which make the topography confusing. However, my dog leg track worked according to plan and the doctor arrived in time.

The weather was still good for the return flight and I felt confident it would be a simple one. The doctor was remaining at Akobo but I had another passenger for Malakal. A last minute addition to his baggage was a duck, recently shot and destined for supper. Could we take it? Yes, of course; weight was certainly no problem!

So the duck, nicely wrapped in heavy gauge tinfoil, was deposited on the floor behind the front seats. I believe that I did have vague wonderings if the compass would be affected, but if so, they were speedily dismissed on considering the three feet or so of distance between compass and duck.

Because this was going to be an easy trip, I did not bother to map-read for the first ten minutes. The compass seemed to be very sluggish and non-positive, but I was not unduly perturbed. It probably took over a quarter of an hour for me to realize that the river-swamp combine below did not tally with where I ought to be. The Akobo had some mighty unusual kinks! I was really suspicious of my compass by now. What next? A 180? Yes, but with reference to what? I was at least sure that I was in the sector NW-NE of Akobo, so I settled down to carefully map-reading the ground, using the known fact of my airborne time as a positive factor. Before long I recognized a river combination and located our position as being some 25 miles east of track. Rivers were most assiduously followed all the way back to Malakal.

After my unsuspecting passenger, and the duck, had safely departed, I went up for an air test. Everything was normal—even the runway headings proved accurate.

Nowadays I am much more interested in the nature of my passengers' baggage, and I don't forget that the compass needle is only the faithful slave of the magnetic fields surrounding it.

A. J. MacDONALD

Nairobi, Kenya

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## YOU NEVER KNOW

I'M CO OF THE 142nd Fighter Bomber Squadron, Delaware National Guard, an F-94 outfit, but when this incident took place I was an F-51 jockey in the ETO.

As I made my way toward the *Mustang* I was about to test hop, I glanced up at the stratus hovering around 800 feet. Back in the States nobody would think of test-hopping in such weather, but in England with a war in progress it was routine. The fact that we had no radio ranges, radio compasses, GCA's, ILS, or other modern navigational aids was no deterrent. We did have a D/F station that could give us a steer if we needed it.

This particular aircraft had just undergone a hundred-hour inspection, which required a flight to 30,000 feet and a performance check. I strapped into the tin bird, fired up the musical Merlin, called for clearance to leap off, and the tower replied, "Go, fool, go!"

Snarling and growling, as only a *Mustang* can carry on, the Spam Can left terra firma. I turned to a course of 120 degrees and entered the overcast. Like any other fighter jockey, the first thing I asked myself when surrounded by the murk was, "Mac, what are you doing up here?"

After the first two minutes on the gauges, the butterflies disappeared from my innards. My knee pad contained a flight log planned on the ground and, if I followed the plan, it was a simple matter to let down within a ten mile radius of home base.

At 20,000 feet, I broke out on top of the overcast from where the crystal-clear cerulean sky and endless sea of clouds beneath were a breath-taking sight.

Continuing my climb to 30,000, I leveled off and, glancing over my shoulder, saw the thick, persistent contrails in my wake. They sparked an idea I had long fostered. I spent 20 minutes doing a bit of sky-writing. As I finished the last letter, I chopped the throttle and dove for the cloud deck at 20,000 to look up proudly

*(Continued on page 18)*

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SEE PAGE 69 FOR ADDITIONAL DETAILS


## HANGAR FLYING

*(Continued from page 16)*

at my crude but legible accomplishment. Spread across 40 miles of English sky were the letters—C-I-N-D-Y. . . . my wife's name, in larger letters than any

other man had ever written his wife's name!

Needless to say, after 30 minutes of wandering all over the sky I didn't have the slightest clue as to my position but calculated it as being over the Wash, north of East Anglia. From a weather briefing I knew that ceilings in East Anglia varied from 800 to 1200 feet, so without calling home base for a steer, I poked the *Mustang's* nose into the billowing clouds and bored downward.

When my altimeter indicated 1200 I caught a glimpse of landscape through a rift in the clouds and estimated the ground ceiling to be much less than 800. Easing the stick forward ever so gently, I glued my eyes to the windshield and waited to break into the clear.

It took only a brief moment for the long nose of the *Mustang* to pop out of the clouds—and my heart to pop into my throat. I had no trouble identifying my position. I was smack in the middle of the Bedford Royal Air Force Station where the British tested their barrage balloons! Just off my left wing a balloon scraped the bottom of the overcast and, spread around me over a square mile, were at least a dozen other balloons nuzzling up to the drifting cumulus.

How I missed them, or by what margin I passed between their mooring lines, only the gods who love fighter jockeys could know. But this I promised them—never, never would I try their patience again by letting down without knowing my position.

DAVE MACALLISTER

Folsom, Pa.

---

### TOP YOUR TANKS

I WAS BUSILY BUILDING hours toward my commercial license. It was a dark, overcast night such as you can find only on California's coast when "high fog" has crept inland at the setting of the sun; but I was prepared to make a success of my first solo night cross-country.

The trip north from San Diego to Los Angeles was uneventful. What could go wrong? The coast highway lit by hundreds of headlights, charted my course straight to L.A.

Over a hot cup of coffee in the Los Angeles airport, an idea occurred to me. Why not take a direct course home? This would take me over the back-country of the coast, a lightly populated region of rising foothills. I planned to intercept the coastline at Oceanside, 35 miles north of San Diego.

I stepped outside to refuel. Not a soul around. Oh, well, didn't I have an extra five gallons in the wing tank? That would be more than enough to get me home. I took off.

After a time, over the dark foothills, I made out a faint glow—Oceanside! I'd hit it right on the nose. Glancing then at the panel I realized that the gas gauge for the main tank was bouncing on zero. How long it had been there I didn't know. I turned the wing tank selector to full on and waited for the fuel to drain into the main tank.

A glance at the gauge told me there was something wrong. The zero stared back at me with a steady gaze. Was the gas going in and the gauge inoperative, or was there just no gas going in? I furiously operated the selector switch. No dice. How much time did I have left; was there still a little fuel in the bottom of the tank and in the lines or would she quit now?

I had to pick an emergency spot quick. I had two choices—the dark foothills or the equally dark beaches. Weather and ceiling had begun to improve rapidly and there were occasional glimpses of stars. I made up my mind to take a chance on a water landing, rather than risk the hills behind me. Then, as if a guardian angel had been watching over me, the clouds drifted apart and the bright light of the moon shone through. I glanced to the left and there, glowing in the moonlight, was the white sand runway of a small airport. I'd forgotten about that field.

There was a gasp and a cough from the engine. The prop stood lifeless. If I had a stranglehold on the stick before, I had a death grip on it now.

The moon was sliding behind the clouds. I flicked on the landing light.

Now I was over the edge of the runway; start easing back on the stick—wham! I dropped in like a ton of bricks, but as far as I was concerned, it was the best landing I'd ever made.

Then I heard the gurgle of fuel running into the main tank. The zero on the gas gauge rolled out of sight and a "¼ full" showed itself in the little glass window. The shock of my landing had dislodged whatever was restricting the fuel line.

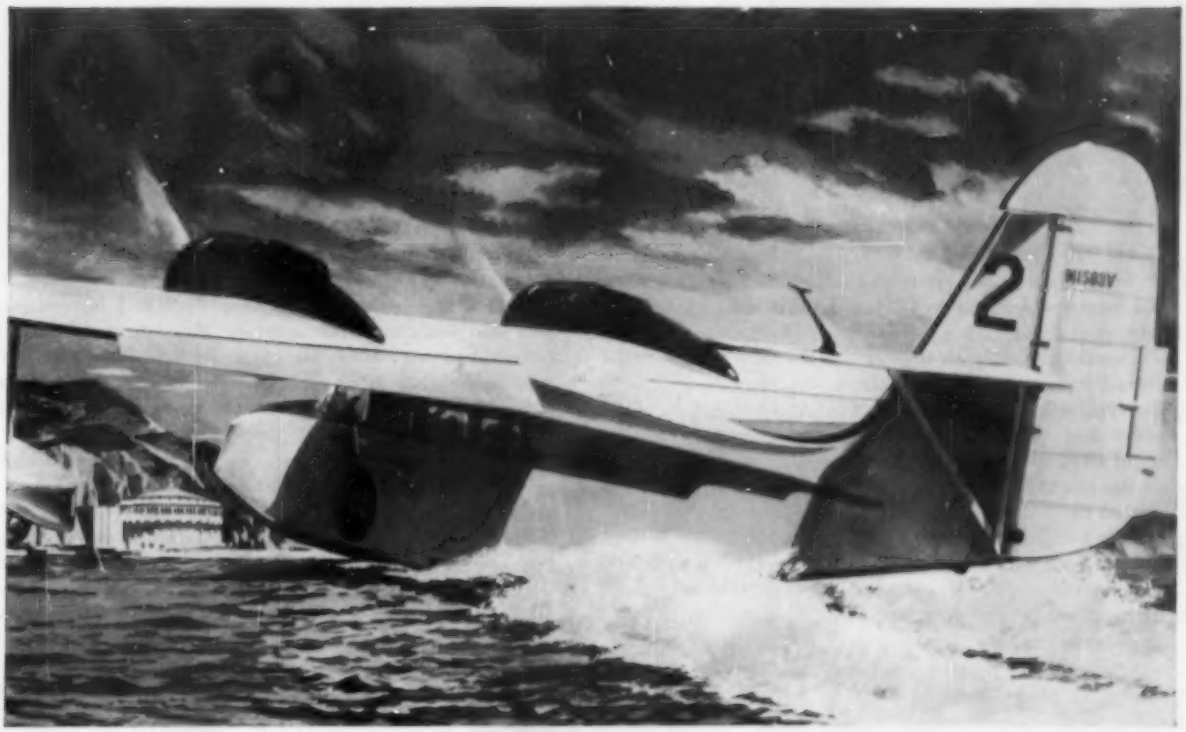
Whether it was water in the gas that formed ice in the fuel line or a piece of foreign matter that had plugged it, I'll never know; but I'll tell you one thing . . . I now top off my main tank at every opportunity.

DICK MARSH

Phoenix, Ariz.

# PLANE FAX

*by* STANDARD OIL COMPANY OF CALIFORNIA



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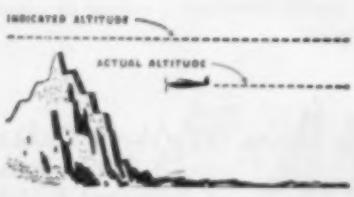
Flying the world's shortest airline run, Dick Probert's Avalon Air Transport planes average 17 minutes a flight over the 32 miles between Long Beach, California, and Avalon Bay on Catalina Island. The route is one of the world's busiest, too, with up to 47 flights a day, and a total of 13,000 crossings and 75,000 passengers carried since the first flight in August of 1953.

"The open sea is one big airport for our Grumman G-21's," says Mr. Probert, "so our over-water flights hold few dangers. But they really give our 450-horsepower Pratt & Whitney's a workout. Long, full-throttle water take-offs, short flights, salt-water spray on the engines; they all call for the best possible lubrication. We get it, too—RPM Aviation Oil gives us 1100 hours between overhauls. And the engines are in good condition even after that time; we overhaul them just for preventive maintenance.

"Another problem we have is very high head temperatures because of our water take-offs. But Chevron Aviation Gasoline 130/87 prevents detonation, and gives us full power when we need it. Never fouls plugs, either."




### TIP OF THE MONTH

It's not true that a pressure altimeter always gives actual altitude in flight. Temperature, outside pressure changes, etc., can cause errors as much as 2000 feet in altitude reading.

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FLYING
VOLUME 59, NO. 1
JULY, 1956

AN EDITORIAL

# Clubs Could Be Trumps

THERE IS NO SINGLE WAY to put a grass roots foundation under American airpower. There are ways and means which can go far toward that end. One of the very most promising is development of flying clubs.

I speak advisedly on this subject because back over the years I have seen some rich results produced by clubs. In one typical instance, a smart operator organized a club of pilots and would-be pilots, none of whom presumably could afford a personal plane. He provided the plane and let the club pay for it gradually out of monthly dues. He steered the thing along with advice and reasonable instruction and maintenance rates—probably didn't make a direct nickel on the club. But within several years he sold a dozen different new and used personal planes to members who were supposed not to be able to afford one.

You would be amazed at what people can afford if they want something eagerly enough!

Another club to which I belonged with equal enthusiasm was composed, except for a few of us, of people who could afford a dozen planes each if they desired them. What we got out of this club was organized sport—acrobatic contests, spot landing competition, cross-country racing and that sort of thing. We had a world of fun together that we couldn't have had separately and we produced some sharp pilots.

On still another occasion I gathered forty older Boy Scouts from various Troops, bought them a Fairchild 22, installed a young N. J. State Police Trooper as their Scout Master, and we indoctrinated them aloft. We had no official recognition since the Scout organization showed no air interest at that time—a condition which I understand has been corrected. The end result was that 28 of the 40 ex-air scouts went into Army and Navy aviation when the war came.

One missing element in private flying is the fraternal side. Just owning and flying your own plane can be a lone wolf business. Most people don't want to be lone wolves. The club idea solves that situation. And it's a great meeting ground for old and new pilots, a medium for hangar flying—something we very much lack in civil aviation and without which military aviation could not get along. FLYING carries as much hangar lore and grass roots experience as possible in order to improve this condition, but nothing can replace the intimate personal contacts which flying clubs provide.

Another result I have noticed is that organized clubs provide the safest flying. While an official in aviation, I investigated some 830 crackups over a period of 13 years. Not a half dozen of them involved club planes or pilots! Not one of them involved a club student pilot!

But there is a still deeper significance involved in this matter of flying club development. It represents the American airman voluntarily solving his own problems in his own way.

There are projects of national import so vast that only government has the resource to accomplish them. However, they are few and far between and grass roots aviation is not one of them. Frankly, I don't believe that a nation of people who let government become their patron can expect that it will not eventually become their master. Government, regardless of its form, remains in proper perspective only so long as the voluntary initiative of its citizens outruns their dependence upon it.

And God forbid that we airmen, apostles of a freedom so unique that the layman hasn't even yet caught up with the idea, should whine selfishly for crumbs at the expense of influencing our government further toward the tragic socialism it has barely escaped.

Certainly grass roots aviation has problems of finance and organization, but it has no problems which intelligent effort and devotion can not solve. A goal of 10,000 flying clubs in the United States is not unreasonable. And what a civic force, what an educational factor, what a foundation of commerce and security such a volume of voluntary initiative could provide!

Gill Robb Wilson

*Gill Robb Wilson*
*Editor and Publisher*

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*all fares plus tax*

**AMERICAN AIRLINES**

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IN THE CENTER of the terminal building at the Tulsa, Okla., Municipal Airport, stands a bronze statue—a pilot walking to his combat plane. The work of Robert Weinman, himself a military pilot, the statue is titled "Morning Mission," and commemorates the 16,000 pilots who received wartime flight training in eastern Oklahoma—some 14,000 of whom were trained by the Spartan School of Aeronautics. The turbulent years of World War II are only part of the story, however, for the history of Spartan parallels that of aviation for the past 30 years.

During roughly the last half of that period the school has been directed by Capt. Maxwell W. Balfour, one of the colorful figures of contemporary aviation, a man who flew *Spads*, *Nieuports* and SE-5's in World War I and who still flies. Captain Balfour and Spartan got together in 1939, to the benefit of each other in particular and to the aviation industry in general. As a result, Spartan, which had lean fare in the depression and dust-bowl days, is now one of the most vigorous components of a flourishing aviation era.

Still producing its far-famed technical training, with the accent now on flight engineer instruction, Spartan is also one of the nation's largest private enterprise service and overhaul bases, and a major aircraft conversion contractor for the Air Force. In the past several years it has additionally handled a large share of Army's fixed and rotary wing maintenance. Another segment of the enterprise, of which oilman J. Paul Getty is president, is the Mobile Homes Division which produces Spartan house trailers under the supervision of son, George F. Getty II.

The Spartan industries had their beginnings, as "a speck

Fairchild PT-19's at Spartan's Army Air Corps Flight Training School at Tulsa, Okla., in 1940.

Opposite page: Tulsa Municipal Airport as it looks today with Spartan facilities at right side of field. Note new 10,000-foot runway. Left: The field as it appeared in 1940 showing Spartan School in foreground.

Paralleling aviation history for the past 30 years, Spartan School of Aeronautics is still pioneering for the future.

By ED MACK MILLER

# SPARTAN OF TULSA

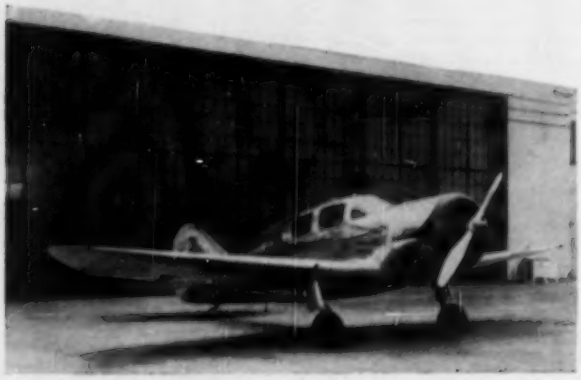
Spartan instructor teaches class on Aircraft Instruments.

in the sky." The speck was a *Jenny* flown into Tulsa shortly after the "war to end all wars" by an ex-army barnstormer, Duncan A. McIntyre. McIntyre whetted oil-rich Tulsa's appetite for the future of aviation, and when young Willis Brown designed and produced an aircraft under the name of Mid-Continent Aircraft Company, one of Tulsa's most imaginative citizens, W. G. Skelly, became interested.

"Bill" Skelly, born in 1878 at Erie, Penn., had entered the oil business at 16 in Pennsylvania, later operating in Ohio, Indiana and Illinois. He became an independent operator in 1903, forming the Skelly Oil Company in 1919. Even thus early he flew on personal and company business and had led in raising money for the original Tulsa Airport. He had helped to incorporate Safeway Airlines (the name still appears over the door of one of the hangars at Tulsa) which operated through that city from Oklahoma City to St. Louis, until it was sold to a larger commercial airline. On the side, he pioneered public acceptance in Oklahoma by promoting "airplane tours." To Skelly the next step was producing planes and so, together with other progressive businessmen of the southwest, he purchased in 1928 the assets of the Mid-Continent Company and built a new factory adjacent to Tulsa Airport. The main plant boasted 50,000 square feet of floor space and was equipped with modern machinery. With this facility, Spartan Aircraft literally began to soar.

Nineteen hundred thirty was a big year for the infant aviation industry. The Spartan factory, the first in Tulsa and largest in the state, flourished while young men the world over perused Spartan's handsomely illustrated brochure on opportunities in commercial aviation, describing the five courses in Spartan's curriculum.

One of the first planes to roll from the new factory was the C-3-225 biplane, boasting capacity for three persons and 40 pounds of baggage. Another was the



The world-famous, all-metal Spartan *Executive*, manufactured in 1935, was considerably before its time and many of them are still in use.

C2-60, a low-wing monoplane, called "one of the nation's first lightplanes." The famed Cloyd Clevenger, aviator, soldier of fortune and author, became Spartan's Mexican representative. Frank Hawks, speed pilot of the Texas Company, praised Skelly's planes and bought several for his concern.

In 1930 Spartan added an advanced transport course to its curriculum, and launched a promotion campaign to sell sheriffs and peace officers on coping with lawbreakers by air. The Company also got into the military business by selling planes to the Honduran government. Spartan likewise sold planes to drilling and oil companies for emergency parts distribution and survey work. The "great prosperity" had not yet collapsed and flying folk were certain that national economy would soar to fresh records on the wings of the zooming aviation industry.

At Spartan, which was getting more flight and mechanic students than it could handle, the snappy uniform was the thing of the day. Technician students wore spotless white, and flight students were outfitted in natty tan gabardine trousers, striped with yellow, shirts of Irish poplin, and overseas caps. Instructors were quietly resplendent in navy blue. Spartan had become the "largest and oldest flying school in the South," when the bottom fell out of everything.

Fortunately, Tulsa was one of the best places in the U.S. to ride out the depression, for Tulsa had oil and men like Bill Skelly with foresight to see that hard times wouldn't last forever.

Spartan survived the "workless, WPA years," training hundreds of mechanics and pilots, and its factory built the trainer, C2-165, a favorite with civilian flying schools as a "blind flying" ship. This low-wing monoplane was a success when military authorities said low-wing planes were not suitable for pilot training. Born of the depression too was the handsome Spartan *Executive*. Produced in 1935, it created a sensation with its all-metal construction, low-wing, non-externally stressed design, complete with retractable landing gear. In 1937 came the 8W *Zeus* trainer to forecast the trend to military types and portend the growth of war clouds on the horizon.

Max Balfour, who was to lead Spartan through the war years and the succeeding decade, became allied with Bill Skelly when he came to Tulsa to look over a Spartan *Executive* he hoped to fly around Europe for Daniel Sickles. Skelly was over-burdened with enterprises—the Skelly Oil Company, the Mission Corporation, the Pacific Western Oil Corporation. He had built radio station KVOO in Tulsa, and led the move to establish the local stockyard and erect the University of Tulsa stadium. He sorely needed, among other talented help, a sales manager for the aviation end of his enterprises. So Balfour never got to Europe in the *Executive* plane. He stayed at Spartan and, as the war clouds grew, become temporary director of training activities.

Skelly could not have found a man better suited to the job. A native of Traer, Iowa, Balfour grew up on a western farm, graduated from Northwestern University, and went to France in 1916, where he drove an ambulance until June of 1917 when he enlisted in the Aviation School of the U.S. Army Signal Corps. He served in the 213th pursuit squadron as a first lieutenant.

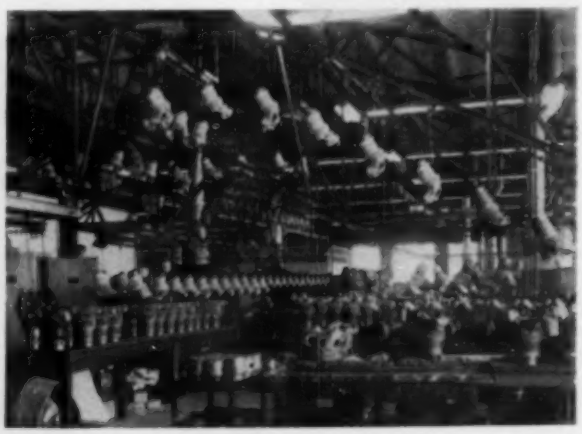
In France, he flew Farmans, Sopwith *Camels*, *Nieuports*, *Spads*, *Voisins* and Avros and Brequets, Morane-Saulnier *Monosoupapes*, and S-E 5's. Since 1916, he has flown 45 different types of military craft alone. He joined the Caterpillar Club in '28 when his wings came off during a roll. A year later, on a test flight over Long Island, his plane caught fire and, in the crash landing, Balfour was critically injured. He spent two years in Walter Reed hospital recovering from terrible burns and retired as a captain, in 1931, due to physical disability.

Balfour had no sooner taken over his temporary assignment as Director of Spartan's training activities than Gen. "Hap" Arnold wanted to see him. He flew back to Washington, half suspecting what was up. The hunch was right, because, gathered together in Washington was a group of old Army pilots who were operating private flying schools—C. C. Moseley of California, Bill Long of Dallas, Hal Darr of Chicago, Oliver Parks of St. Louis and Claude Ryan of San Diego, along with Allan Hancock and E. S. Sias. With Balfour, these were to become known as the "Eight Incorrigibles."

General Arnold gave them the pitch. The Army would have no time to prepare primary flight facilities if war came. A broad base must be laid immediately for the greatest air force in the world. These men had the "know-how" to do it. Would they voluntarily expand their schools on the chance of being able to raise money from Congress? The General appealed to their patriotism.

The deal was hardly bankable. It looked insane to lots of people, but not to those old timers. They flew home and some of them even mortgaged their homes to get capital for expansion. Balfour was more fortunate than the others. He had W. G. Skelly and J. Paul Getty behind him and as yet he didn't have a home in Tulsa to mortgage.

The government gave Spartan six weeks to build barracks and restaurants, to buy and install new equipment, to find and train flight and ground (*Continued on page 86*)



Cylinder Overhaul Department in Spartan's new overhaul facilities where cylinders are re-conditioned in this special section of the shop.

**The last flying boat to be built for civil aviation was truly "an ocean liner of the air". This fine old Boeing was**

# A SHIP TO BE LOVED

By BEN ANDERSEN

DEEP IN THE NIGHT the "Anzac Clipper" was winging the Pacific, en route from San Francisco to Honolulu. The navigator had just taken a celestial fix, which established that they had passed the point of no return. Twenty passengers were asleep in the luxurious staterooms below the flight deck. The radio officer was listening into the night. Then out of the stillness came the ship's call letters. The date was December 7, 1941. The secret message read simply "Plan A." But its meaning was electrifying. War had come to the Pacific.

A secret diversion procedure for all Pan American Airways aircraft had been planned in case war should come unexpectedly. The message was flashed to company bases in the Pacific and Europe. Simultaneously Pan American was taken over by the Navy, mainly because it was the only airline of that time with sufficient experience in overseas flying.

Twenty-five hundred miles west of Honolulu the "Philippine Clipper" had just left Wake Island for Guam, when the dramatic message reached its cockpit. In 20 minutes Captain Hamilton landed back at Wake. The Marine Commander there asked him to take the aircraft in search of Japanese carriers. But before Hamilton could get back aboard, the pounding of Wake Island was on. Japanese fighters perforated the Philippine Clipper with 97 bullet holes; but they didn't destroy her. Hamilton stripped excess gear and jammed some 70 civilians into her cabin. After three attempts, the ship staggered into the air and, with no gas to spare, made it back to Midway and thence to Honolulu.

Suddenly every Pan American route became a vital artery, and most important of all was the transatlantic service, flown by the biggest aircraft then in existence, the Boeing 314 flying boats. These aircraft made thousands of war time crossings, carrying more VIP's than any other form of transportation. Today's airline operation to Europe seems pat and routine when viewed against the era of the flying boats. Carrying out their secret missions between New York and Lisbon, they truly represented the outright romance of civil aviation, as it once was. They were the last flying boats to be built for civil aviation, and an exciting era faded when in 1946 they disappeared from the skies. Many veteran skippers in Pan American now grinding both oceans in their DC-7's and *Stratocruisers*, still talk about the old aircraft that reached such heights of impressiveness.

When the first 314 was delivered in the spring of 1939, she showed a wing span of 152 feet, a length of 106, and a maximum hull depth of just under 19 feet. Gross weight was 82,500 pounds, and fuel tanks held 4,300 gallons, with oil tankage at 300. The wing had an aspect ratio of 8.05 and, in order to keep the structural weight down, was tapered in both plan and thickness. These tapers produced a thicker wing section near the root, allowing for passageway to the engine nacelles while in flight. These catwalks inside the wing proved of enormous value later on. On one flight, hot engine oil was found leaking on deck. It was natural to assume the engine oil system had failed, but with all lines open to inspection, it was quickly discovered there was a loose connection on the vacuum system oil separator drain line. A method of catching this oil was rigged and the flight continued. All tanks, valves, plumbing for the engine lubrication, de-icer fluid, hydraulic oil and fuel systems were accessible in flight. Thus inspections were made periodically and trouble could be checked before it reached dangerous proportions.

The four Wright engines each gave 1,500 hp for take-off

The Boeing 314 Flying Boat takes off from Horta, Azores, on the last hop to Lisbon, Portugal.

and could develop a continuous output of 1,200. Bottom lines were designed to keep the wave clean and low for a dry hull and to give quick take-off. Lateral stability was obtained by hydrostabilizers. The cockpit was the biggest of any aircraft ever built—average headroom being 6½ feet, almost 22 feet long and 9½ feet wide. Soundproofed and upholstered it was a pilot's dream, and could put many a good ocean vessel to shame. A separate flight engineer station was located in the aft part of the cockpit. The engineer had, of course, individual controls for each engine, some of which were connected with the pilot's master controls. On the opposite side was the navigator's station. Next to the engineer was the radio operator's post. Behind the cockpit were holds for baggage, cargo and mail. Further aft were the crew quarters.

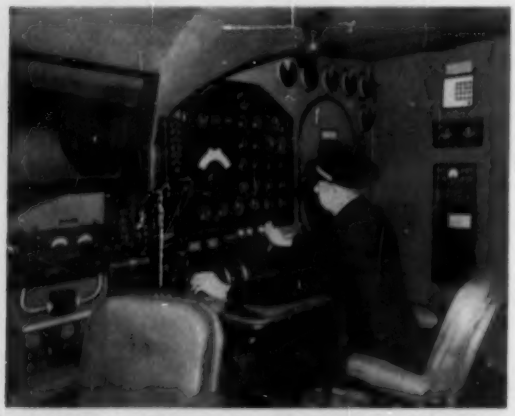
Below this deck was the passenger deck, divided into eleven sections: five standard compartments seating ten and sleeping six each, one special compartment seating four and sleeping two, one de luxe compartment seating six and sleeping two, and a dining salon seating 14 at five tables; a galley, two dressing rooms and three toilet compartments. This accommodation was provided for 72 passengers. In actual operation the aircraft would fly to Europe in style with 40 passengers and 5,000 pounds of cargo. One compartment had a separate love seat. All passengers had berths eight feet long and 36 inches wide, equipped with outside windows. The crew consisted of the captain, first, second and third officers, two flight engineers, one navigator, one radio operator and two stewards. For the first time in airplane history the skipper's post was not at the controls, but at a desk to the rear of the bridge. He handled the controls during take-off and landing but in cruising, practically all his time was devoted to the job of executive officer of this "ocean liner" of the air.

Only 12 *Super Clippers* were manufactured. Of these, three were given during the war to the now defunct British Imperial Airways. The first transatlantic route was from New York to Marseilles via Horta in the Azores, and Lisbon, and not to England as at first intended. The British government refused landing rights in England, because they at the time did not possess equipment to operate a similar route. They also refused Pan American landing rights in Bermuda for refueling purposes.

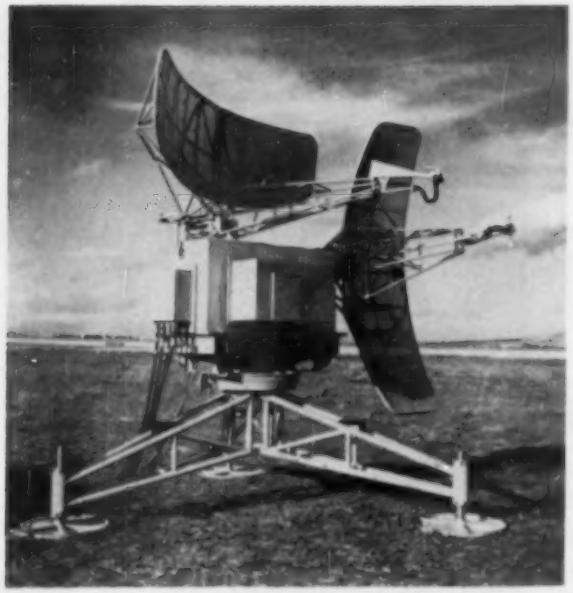
Thus, on May 20, 1939, the "Yankee Clipper" took off for Lisbon from the LaGuardia Marine Terminal under the command of Capt. Michael Laporte. It was the first scheduled commercial flight across the pond, and the entire world was watching.

When the war came in Europe, throngs of desperate refugees jostled each other along with diplomatic and military VIP's at the ticket office in Lisbon. Eventually came Pearl Harbor. As the "Plan A" message flashed across the Seven Seas, the Pacific Clipper aloft between New Caledonia and Auckland, N. Z., followed instructions carried by the captain in a sealed envelope. From that moment on, for more than a month, the operations of Pacific Clipper were shrouded in complete secrecy. Then at 5:54 a.m. on January 6, word flashed from the ship to the control tower at the Marine Terminal at LaGuardia: "Pacific Clipper inbound from Auckland, New Zealand, Captain Ford reporting!"

This flight marked the first circumnavigation of the globe by a commercial plane. The Pacific Clipper had flown from Australia via the Timor Sea, The Netherland East Indies, Bay of Bengal, Persian Gulf, Red Sea, The Nile and Congo Rivers, thence overland to West Africa, Brazil and north to New York. But the Pacific Clipper did not stop there in its role of Glamour Girl of the Pan American fleet. On January 30, (*Continued on page 74*)



**Top: Flight Engineer's panel on the 314. Door at right of panel leads to catwalk inside wing. Above: Cockpit walls were fully insulated. Flag behind captain was flown outside cockpit while taxiing. Right: Dining room amidships. Doors at each side lead to staterooms fore and aft. The door at rear center was used for boarding.**



Design of SPAR is simple and rugged. One antenna sweeps 30 degrees in azimuth; the other, 10 degrees in elevation. Both scan twice per second.

Utility of airports around the world can be greatly increased by use of this simple, reliable

# LOW COST RADAR

By RICHARD S. FINKE

CESSNA 93 Coco, report over the range station—altitude 1,500 feet.

"Cessna 93 Coco, you are positively identified. "Now turn right heading 090° and maintain 1,500 feet.

"Turn further right 095° and start your let-down at 500 feet per minute.

"Cessna 93 Coco, on courseline, on glidepath, one mile from touchdown."

Such instructions, familiar at major U. S. airports can now become equally familiar at airports of less stature.

In determining which airports shall have navigation aids, the CAA logically uses the annual traffic density as a guide. Obviously, the dollar cost of such aids is of primary importance in determining the number of airports which shall be so equipped.

Now available for the first time is a simple, reliable, low cost GCA system which can go far toward increasing the utility of lesser airports.

GCA, developed during the war, has gone through the usual trials and tribulations of any new navigation aid. Pilots originally opposed it because it took much of the responsibility from their hands during critical landing stages. Today, however, GCA has proved itself and there are few pilots who do not appreciate the calm voice of the GCA controller during critical low approaches.

By international agreement for commercial airline operations, GCA is established only as a monitor system. ILS is used as the basic landing aid. In normal practice, many airlines require that ILS indications agree with GCA controller instructions or the approach is abandoned. Of course, in emergency, GCA can be relied on entirely and many landings have been made in zero-zero conditions using only GCA. Because of the lesser degree of pilot training required, the Air Force has fixed on GCA as the basic method of approach control under weather minimum conditions.

Actually, the designation, GCA, refers to a complete system which contains two separate radars. The first, a surveillance or search radar is employed for area control. It usually has a range of thirty to sixty miles, and is used to direct aircraft into the final (*Continued on page 89*)

SPAR setup at Barajaz Airport, Madrid, Spain, includes truck containing power generating equipment, communications gear, and spare parts. Trailer transports radar. During operation, the trailer becomes GCA control center. Truck and trailer are not necessary for fixed airport operation.

Hunting out old volcanoes on tiny lava islands far to the south of the tip of Baja California proved a challenging photo

# MISSION TO BARCENA

By CDR GEORGE CORNELIUS, USN

IT'S 0300, SUNDAY morning, and dark. The San Diego fog all but smothers your car headlights stabbing bluntly ahead to pick up the sign, *Miramar—Navy Master Jet Base.* You turn off Route 395 and the Marine Sentry salutes at the gate. You pass through, wondering how he can click his heels so alertly at this ungodly hour.

The squadron duty officer has the navigation office open for you. The charts you laid out yesterday are there with the briefing folder from the Photographic Department. Another folder contains your howgozit curve, a thin blue line betting fuel against time and distance. You open the chart packet, reach for a blank DD 175 form and a pencil.

"Flight plan. Pilot's name—Cornelius, G., CDR, USN." That's you. "Co-pilot—Peck, S. E., LT., USN. Aircraft type—AJ-2P. Instrument Flight Rules—1,000 on top—direct Los Coronados—direct San Benedicto-Socorro Islands—return same route. Distance—1,900 miles. Estimated time en route . . ."

The office door squeaks. " 'Morning, George. Charming day. Clearance come through yet?" Scotty Peck yawns widely.

"Dispatch from ALUSNA, Mexico City arrived last night."

"Why did we need diplomatic clearance for this hop? San Benedicto and Socorro are only a couple of little old volcanic islands."

"Right, but they belong to Mexico. You can't fly over foreign territory without clearance, especially on a photo mission."

"I know. And Scripps (Scripps Institution of Ocea-

The brooding beauty of Barcena Volcano on San Benedicto Island which is one in the chain of Revillagigedo Islands, Mexico.

Photo version of North American's AJ-2 *Savage* atomic bomber used by the author to obtain desired pictures of remote island volcanoes.

nography) wants shots of the volcanoes. They're virgins."

"The institute wants pictures of the whole island. Both islands, in fact. Complete vertical and oblique coverage."

Scotty whistles. "That'll take petrol! I figured the hop for 20 minutes over target. That would bring us back to San Diego with 2,000 lb. of fuel, plenty for 30 minutes to El Centro, 15 for let-down plus 45 thereafter in case Miramar is socked in."

"Gotta figure it again. Photo broke the news last night after you left. First run at 1,500 feet for obliques. Climb to 20,000 for verticals. Coast home on the fumes."

You buckle down with Scotty to recompute the howgozit and the phase plan. You have some oddball problems to lick, for the AJ is an oddball airplane. Your model, the 2P, is the photo version of North American's *Savage* atomic bomber. The entire flight is over water. Thinking of gas again, you wish ComAirPac could spare a carrier for you, but he can't. The two R-2800 recips piston engines in your wings, with a jet in the tail, eat up hi-octane in slurps of varying sizes, depending on the power demand. Take-off gross will be around 25 tons. Lifting it off the deck will make the jet swallow 90 lb. a minute and the recips will drink 20 more apiece. A four minute climb to cruising altitude will take 520 lb. At level-off, you'll secure the jet and cruise on the recips, "conserving" fuel at the rate of 10 lb. a minute per engine. Every cruising hour, you'll average 200 gallons burned.

But the hop won't be all cruise. After your low runs, you'll climb with the jet to 20,000 for vertical photos. Better do the south island first, get the benefit of long cruise. Then north and west for the other island. A swing south and the climb to 20,000 will cover the 30-some miles between islands again, and the trip back north for verticals will put you that much closer to home, high, where you can convert altitude into fuel reserve. That jet-assisted climb will clobber your howgozit at 60 lb. a minute, and the recips at 20,000 turn into slavering gluttons. Will you have enough to make it? Got to have that alternate plus 45 plus let-down.

"No can do," states Scotty glumly. "A thousand pounds won't give us 45 minutes at El Centro. We might need it, too. Aerology sheet predicts ground fog here at our ETA."

"That means a GCA. We need another 500 lb. in case of wave-off."

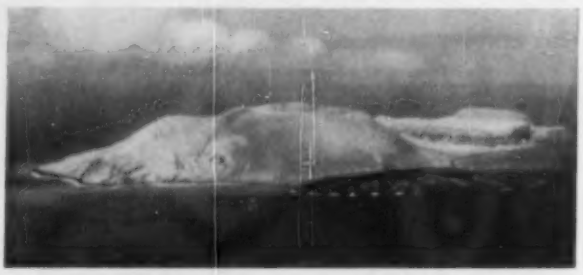
"Hey!" Scotty brightens, "How about that trick we used in WestPac? Warm up, taxi to the runway, cut engines, then top off with fuel and take off."

"It'll work. Our warmup and taxi allowance is 500 lb."

"Okay," rejoins Scotty, "But let's just get her warm, huh? Not hot."

"Roger. Now let's hit the Photo Lab for final briefing."

Photo chops a little finer what you already know. Scripps has requested aerial photos of San Benedicto and Socorro Islands, tiny lava spots far south of the tip of Baja California. The Chief of Naval Operations has called on your Photographic Squadron, VJ-61, because it's good training in the type of long range photo-reconnaissance a Navy long range photo outfit does in wartime.



Another view of Barcena Volcano on San Benedicto Island, Mexico.

War plans don't concern Scripps in this matter, though. They want to see how life evolves on volcanic islands, far from mainland flora and fauna. The savants can learn a lot about evolution that way. Whether your aerials prove Darwin right or wrong, it's still a challenging photo mission.

Photo tells you to make one low pass by each island, two miles out from the coast, for oblique coverage with the six-inch side mounts. For the 20,000 foot vertical photos, you have an elaborate array of classified gear whose pictures will enable the scientists to count the hairs on a spider's leg—if lava will support a spider's diet.

"Better make your verticals," says LCDR George Dougan, VJ-61 Photo Officer, "on the return run, directly over the islands. You'll want to finish up as near home as possible. Or do I need to tell you to save gas?"

"You don't," replies Scotty.

Final stop on the briefing rounds is Aerology. Chief Aerographer's Mate "Whitey" White, Miramar's smiling pessimist, predicts good weather and calm winds both ways. "But," he grins, "maybe you noticed the—ah—mist? You'll have it up to 2,500 feet after take-off, and ground fog is forecast here at your return ETA. El Centro's your best alternate. How's your gas?"

"Gas," growls Scotty, "is what you should take. Why can't you guys ever say nice things?"

White's grin widens. "We don't make the weather, we just talk about it."

LCDR Charley Wall, Opera- (*Continued on page 54*)

Rugged Socorro Island, Mexico, with Mt. Evermann in the background.

The auther with his Luscombe proudly wearing leopard jacket and cap of his own design.

*The clouds were stacked just right as we surprised a glider pilot at 17,000 feet the day*

# I SOARED A LUSCOMBE

By DON C. STEVENS

HAVING JUST TAKEN first place in class "C" utility type sailplanes at the West Coast Soaring Championships at El Mirage airport near Adelanto, Calif., I was in a happy mood, so remained over a day to help my friend, Charles Webber, make his first real soaring flight in a Baby Bowlus utility glider, which I had sold him a few months previously.

Before he took off behind Gus Briegleb's tow plane, Webber suggested I fly his Luscombe and take pictures of his flight. I said, "That's okay with me if I can find someone to go along."

I have over 3,000 hours in gliders but only about 300 hours in power, and my power flying has been strung out sparsely over 24 long years. I was a glider pilot during World War II and most of my power flying was done at that time in *Cubs* and C-47's. Recently, however, Webber had let me fly his Luscombe a few times and said I was quite safe to solo.

After Webber had been towed off, I scouted around and found a pilot, A. T. McCarty who had just flown in from Long Beach, in a Luscombe similar to Webber's. He agreed to go up with me. I would fly the ship and he would take the photos. Once airborne we saw immediately that it was a wonderful day for soaring, but little did we know what was in store for us on this flight.

To the east of us about two miles were six large twisters, dust devils, which appeared to be evenly strung out in an oblong pattern four to five miles in diameter. We were climbing under our own power when we entered the first twister at about 1,000 feet. Immediately, we felt strong lift. Since we did not have a rate of climb indicator in the ship, I used the sensitive altimeter. By constantly tapping on the instrument, I could reduce the lag and almost get an accurate reading up or down. We spiraled in the twister, which that day was turning clockwise. Of course I spiraled counter-clockwise, against the wind. The altimeter started to move up fast, so I reduced power on the Luscombe to 1,800 rpm. I kept on tapping the altimeter and it still swung up fast—we estimated 400 feet per minute. We spiraled twice in this twister and jumped over to the next one about a mile away. Just before we entered the second twister, I noticed we had gained 500 feet in that first one. Inside the second twister, the air was very turbulent and we could see pieces of the desert flying around us—tumbleweeds, leaves, even cobwebs.

I left the rpm at 1,800 and headed for the third twister, having gained another 700 feet with three spirals in the second one. Just before I entered the third, I reduced power to 1,500 rpm and still was climbing 400 fpm. My friend McCarty was all smiles, and pointed to the rpm. He could hardly believe we were climbing 400 fpm with 1,500 rpm.

Each time I decreased power I had to trim more "up" elevator and I found at 45 to 50 mph indicated was the Luscombe's best thermal climbing speed. When I tried 55 to 60 mph the altimeter moved up more slowly. I learned the same thing happens in soaring a power plane that happens when soaring a glider.

By the time we had flown thru all six twisters, I had the Luscombe throttle completely closed and was 5,000 feet above the field, or 7,860 feet above sea level, and it took 11 minutes flying time.

We were now headed west and saw in the distance some two miles away, a very large twister about three times as big as any we had flown through. I left the throttle completely closed and glided towards it. The altimeter stayed at approxi- (*Continued on page* 90)

# THE AIRMAN'S WORLD

**Hither and yon** above our landscape searching out the sweetness of life, like bees over a meadow of white clover, wing more little planes than take the air in the combined remainder of the world, theirs a pursuit germane to the whole unfolding human story—the pursuit of happiness. For is not the pursuit of happiness one of the trinity of objectives set forth in the very foundations of our heritage? And so pertinent it is that not even the weighty future of the air ocean with its imponderables of commerce and conflict can deny the bright firmament to them who pursue it there. It is neither adequate nor accurate to assay that those in the little planes are flying for the sheer fun of it. Of a certainty they find moments of lightness of heart since the pursuit of happiness is rarely a grim ordeal, but their satisfactions touch a deeper chord than gaiety alone. There is a ripeness of mind and harvest of soul from the disciplines of wind and sun, the requirements of mechanical laws, the vantage points of far horizons. There is confidence to be acquired in the exercise of skills. There is a sense of responsibility to be accrued in the

voluntary regard of safety and sanity. And it certainly adds up to more than fun alone.

I can feel a pity for him who has never looked down upon the sweep of it all until he lost consciousness of its divisions by deeds and titles and townships and counties and murmured to himself—this is my land, my home land, my country.

I can have a sadness for him who has never lost himself in the deep glory of "thy rocks and rills, thy woods and templed hills." I can feel cheated for him who has no awareness of the land as it changes its garments in season and washes its face at the spiggoted clouds, and nurtures its myriad forms of life. And this too adds up to more than fun alone.

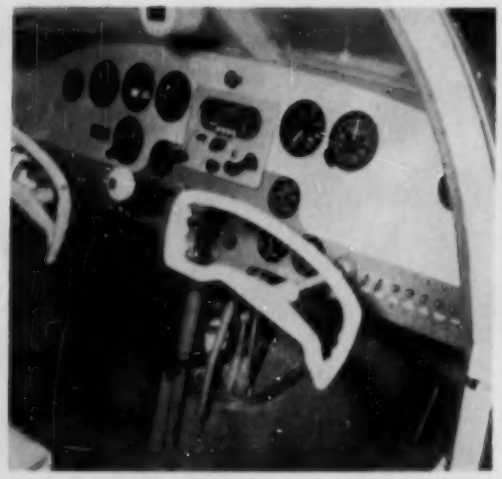
Once upon a time the man in the Ercoupe was a boy in a Liberator over Schweinfort or in a P-47 over Iwo Jima. He was about the business of buying a future for himself—and for the land now beneath its wings. That was indeed grim business.

But this is what he bought and it is anything but grim—this Maryland countryside of his on a summer's day—this corner of his airman's world.

GILL ROBB WILSON

*Photograph by Hans Mara*

By utilizing positive design features, the Mooney *Mark 20* exceeds the 1:1 mph/hp ratio and cruises 165 mph.



Radio of the *Mark 20* is located in center of panel. Handles of manually-operated gear and flaps appear just below.

Bob Kucera of Jimair, Inc., (left) shows author how panels can be removed from outside to facilitate maintenance on instruments and wiring behind instrument panel.

Ed Lyons (left, front) demonstrates the *Mark 20* with a full pay-load.

Twin exhaust augmenters and squat landing gear distinguish the *Mark 20*.

CHECK PILOT REPORT

ON THE

# MOONEY MARK 20

**A private pilot checks the characteristics of this exceptional airplane and finds it really easy to fly.**

By TED DUROSKO

WHEN THE NEWS was received that Mooney's four-place *Mark 20* had exceeded the 1:1 ratio in reference to miles-per-hour/horsepower, it caused quite a discussion around the coke machine at Sky Haven Airport (south of Cleveland, Ohio) where I base my airplane.

How did Mooney achieve 165 mph cruise with a 150 hp engine in a craft which grosses 2,450 pounds? Can it really accommodate four average size persons? Does the laminar flow type of wing give it hot or tricky flight characteristics? Can it operate off short turf strips?

These questions and others were tossed around. Many of them went unanswered at the time as none of us had any first-hand information. So when the opportunity to fly the Mooney *Mark 20* presented itself, a short time later, I went about the task armed with a list of questions raised by the boys at Sky Haven.

My approach to evaluation of the airplane was on three major qualifications: The utility factor? How much maintenance might be involved? How desirable are its flight characteristics? After being checked out, I flew the *Mark 20* approximately 1½ hours to observe its characteristics.

With data recorded during the flight, I then compared notes with Bob Kucera, vice president and general manager of Jimair Inc., whose headquarters are at the Cuyahoga County Airport, Cleveland. As the company is a distributor for the *Mark 20*, Kucera possibly has more *Mark 20* time than any other pilot in this area. Our notes were remarkably similar, which points out that a relative stranger to the plane can get good performance from it soon after taking over the wheel.

In appearance the Mooney has a "forward" look even as it sits on its tricycle gear. Its low wing configuration gives the impression of a speedy, stable craft—which I found it to be.

Singling out one feature which caught my eye, is the wing spread of 35 feet, and the modified laminar flow design. The thickest point of the laminar design is much farther back from the leading edge than most wing designs. It has the advantage of providing enough lift to sustain flight with a low angle of attack in cruising altitude, which reduces drag and results in more speed.

At the optimum cruising speed—165 mph using 75 per cent power at 4,900 feet, the *Mark 20* has a range of 750 miles of 4.6 hours, with a 15 minute reserve. If you wish to use the economy cruising speed of 150 mph, which is 55 per cent power at 10,000 feet, the range is 900 miles or 6 hours with a 15 minute reserve.

In fuel load the Mooney carries 50 gallon total distributed in two wing tanks each of 17½ gallon, and a 15 gallon auxiliary tank located under the rear seat; 49 gallons are usable.

Concerning items that reflect maintenance, we found the *Mark 20* powered with a four cylinder Lycoming 0-320 which churns up 150 hp at 2,700 rpm. The engine is equipped with a Hartzell 74-inch, metal, constant-speed, controllable pitch propeller. Twin augmenters under the nose aid in keeping the engine cool on the ground and are reported to give added thrust in flight.

The cabin section of the fuselage is constructed of chrome molybdenum steel tubing covered with aluminum skin. The aft section is aluminum monocoque frame, while the empennage is of wood construction, adjustable for trim. A single control located between the two front seats trims the entire tail assembly—vertical fin and horizontal stabilizer. There are no control cables or pulleys exposed. Push-pull rods ride on ball bearings.

Checking external features again, we noticed that the gear is a larger version of the reliable M-18 gear. Retractable, it is mechanically simple and constructed of heat treated tubing, knee action with rubber disc shock absorbers. The nose wheel is steerable with the rudder pedals.

One other good feature is the baggage compartment, accessible from the outside, the door of which swings out and up at a comfortable working height. The compartment itself is low slung and will accommodate 120 pounds of cargo.

Roominess apparently was on Mooney's mind when he designed the *Mark 20*. This becomes apparent when you slide into the lefthand seat and notice the head room. Likewise the width of the cabin is surprising. Bob Kucera, who is close to my build and weighs 180 pounds, sat in the righthand seat and we still had about six inches between shoulders.

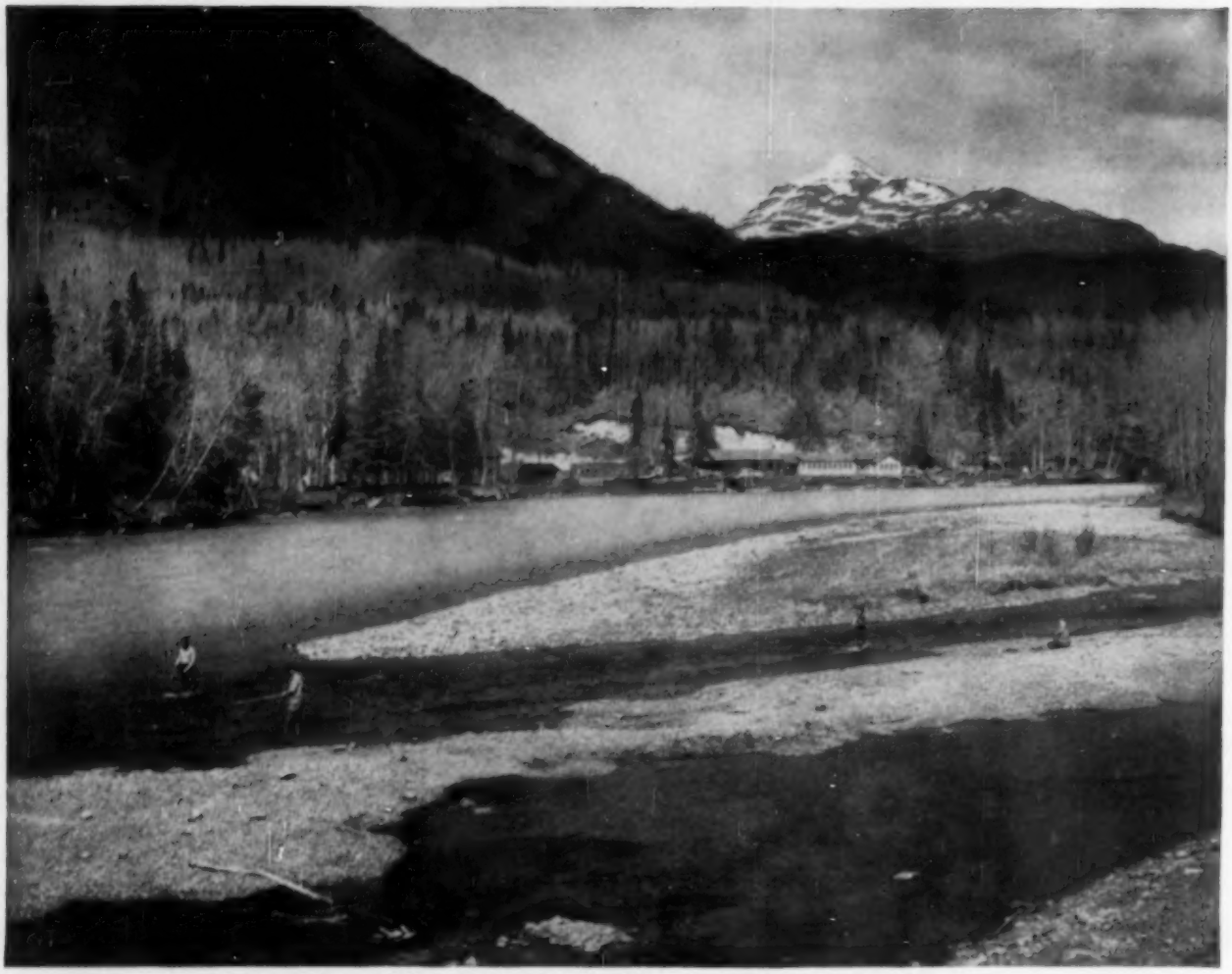
The cabin is "functional" from the standpoint of the pilot. The fuel selector, for instance, is located on the floor just under the front edge of the pilot's seat. It is an arrow shaped lever which points to the tank being used. It selects tanks with a firm and smooth movement, and has four positions: *Off*—the lever points straight ahead—to the left, that wing tank is *On;* to the rear the auxiliary tank is *On* (to be used in level flight only); and when the lever points to the right, that wing tank cuts in.

Controls are located conveniently. The large handle of the flap control is in the center between the front seats. Just above it on the panel is the throttle and prop pitch control. Squarely in the center of the instrument panel is the Narco Superhomer, accessible to either pilot. Grouped in front of the left seat is the flight section of the panel. Engine instruments are on the right side while various switches dot along the bottom edge of the front panel.

Starting of the Lycoming follows an orderly, simple check list. First the gear is checked in the *locked* position; then the following steps are recommended:

Fuel valve *On* (right or left).

Check auxiliary electric fuel pump—Flip toggle switch to *On* and listen for slow ticking sound while observing the fuel pressure gauge for (*Continued on page 92*)



Fishing at the mouth of Russian River where its clear waters join the glacial Kenai River.

Pilot Paul Kroenung holds fishing rod for bearded lawyer, Wendell Kay.

*Cub* makes tricky landing on curved and sloping sandbar in Kenai River.

Left: U. S. Fish and Wildlife Service plane on one of the many small well-stocked lakes on Kenai peninsula. Right: Lake Spenard (foreground) and Lake Hood, joined by man-made canal, are filled with privately-owned float planes, plus a few for hire. Anchorage International Airport at left.

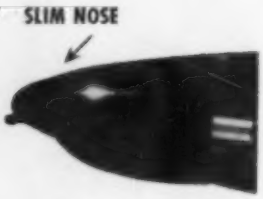
# COMMUTING FISHERMEN

ALASKANS are used to a vigorous life, whether at work or play. During the week, businessmen often take an early morning fishing trip such as those sponsored by United Airmotive, Inc., of Anchorage. A four-passenger plane leaves Anchorage at 4:00 a.m., speeding the fishermen to the rainbow and steelhead country of the Kenai Peninsula in less than an hour. From there they are ferried by Cub to a small sandbar in the Kenai River. They usually can catch their limit of fish and return to Anchorage in time for a day at the desk. The best hunting, most spectacular scenery and some of the best fishing on the peninsula are still not touched by the new highways. As in the rest of frontier Alaska, flying is taken for granted, whether for business or pleasure.

Bob Snell, O. C. Mudd and Wendell Kay compare their catch before putting it on ice.

An Anchorage businessman is shuttled back from early morning fishing in time for work.

# TROUBLE AT MACH 1




**Reaching sonic flight is far from simple. Problems encountered by our planes in the region of the speed of sound present a real challenge.**

By ROBERT CASARI

ON AUGUST 20, 1955, the sonic barrier was pierced by North American's F-100C, *Super Sabre*, to set the first supersonic world's speed record of 822 mph, or about Mach 1.24. The long road of technical development that led to this epoch flight is now history, but not many of the secrets discovered along the way are generally known.

The public has become so conditioned to the well publicized Mach 2 speeds of the experimental Bell Z-1A and the Douglas D-558-II that the true significance of the F-100's flight has been almost overlooked. The *Super Sabre* is not a research ship designed to exceed the speed of sound for a few seconds, record flight data and make a deadstick landing on an endless salt flat. Here instead, is a combat fighter-bomber capable of delivering the atomic bomb over medium ranges and mounting four 20 mm cannon and guided missiles.

It is these basic differences that are important. Every-one of the countless flights by our research ships was aimed at providing design information to push a heavy combat plane past Mach 1. The F-100C attained that goal. Though security prevents quotation of exact figures, several other fighters also have passed the same mark, notably the McDonnell YF-101A, the delta YF-102A, Vought XF8U-1 and the Grumman XF11F-1.

Their very numbers would seem to imply that the "sonic barrier" has been completely bridged and is no longer a problem. Nothing could be further from the truth! Knowledge of exactly what takes place in the transonic region, extending from about 550 to 900 mph, is extremely limited. This is obvious when the troubles encountered by nearly every one of the above ships at some time in its flying career, are considered.

A good example is the F-100A which entered production in October, 1953 and yet could not be placed in squadron service until February, 1955, after the fin assembly had been extensively modified. The prototype YF-100, which made its first flight May 25, 1953, had a tall fin and full length rudder patterned after the F-86, as can be seen in Fig. 1. On early production models the fin was shortened and the rudder dropped to a position near the body. In this form the ship was unsatisfactory. The vertical tail assembly failed during uncoordinated high-rate roll. To overcome this, the fin area was increased, more area added at the wing tips and the control system revised. Extensive flight testing showed the revised version to be completely combat-worthy and all previous production planes were so modified before acceptance by the Air Force.

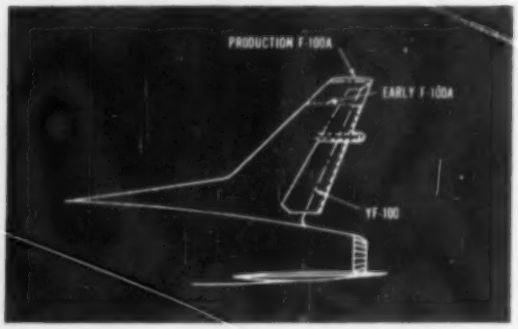
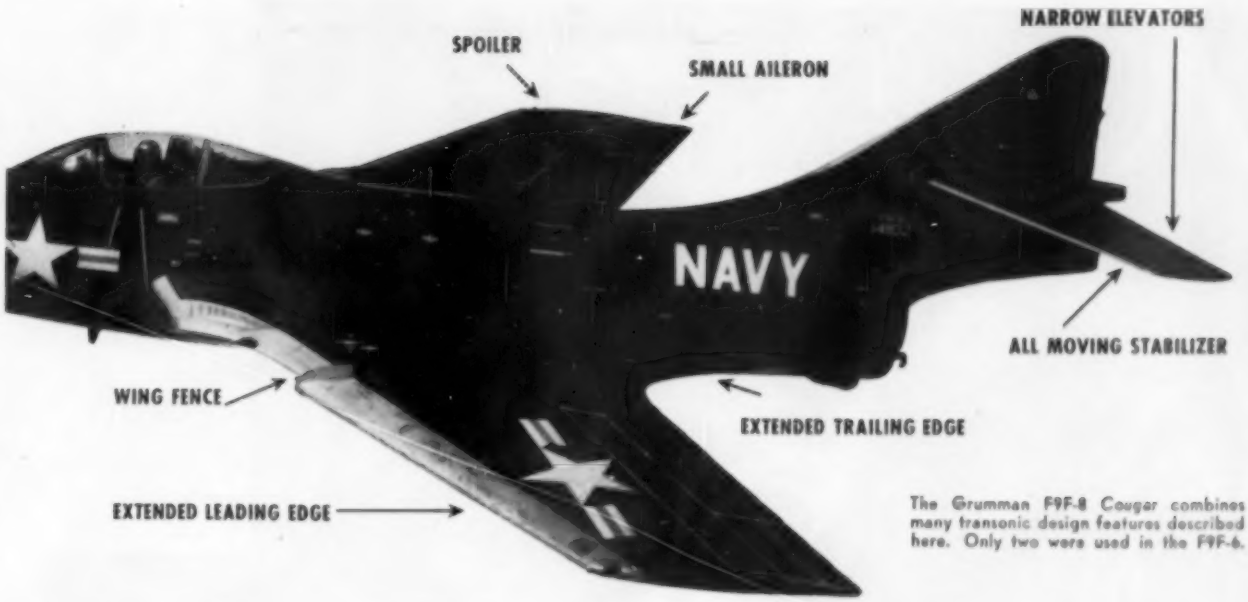



FIG. 1

This example is only one among many of the radical problems that have accompanied high-speed flight. Virtually every type of control surface fitted to subsonic planes had to be altered to perform properly in the sonic range. One of the earliest changes occurred in the stabilizer-elevator assembly. It was found that loss of elevator effectiveness at high speeds, coupled with tremendous pitching forces, could cause complete loss of control. One of the first production planes to overcome this problem was the F-86E which mounts an all-moving horizontal tail in which the stabilizer is power operated with the elevators. Since a few degrees movement of the stabilizer is as effective as 20 degrees of elevator motion, the pilot could now exert many times the stabilizing force available in the F-86A. This system is used on nearly all our fastest planes up to the light bomber class, including the RB-66A, F3H-2, F-101A and A4D-1, to name a few. The latest variation is in the F-100A, where the elevators have been completely eliminated from the power operated tail. One of the most obvious revisions to the basic control system was in the aileron installation. Up to the present time these have been located at the wing tip. There they exert the maximum rolling moment for a




The Grumman F9F-8 *Cougar* combines many transonic design features described here. Only two were used in the F9F-6.

given stick force by the pilot. At speeds much above 600 mph the force exerted on the wing climbs rapidly and, under the influence of shock wave formation, flow patterns change drastically. The final effect of these and other sonic problems is to cause control reversal.

Several solutions are now flying on current military planes. The FJ-4 *Fury* has ailerons, rudder and elevators adjacent to the fuselage where deflection of the wing and tail surfaces is at a minimum. On the F-100A *Super Sabre* and the F3H-2 *Demon*, the ailerons are at about midspan, while the British Folland *Midge* has ailerons placed alongside the body.

In the bomber field, the B-47E uses a conventional system in spite of the extreme flexibility of the wing which is designed to flex through an arc of about 20 feet at the tip. This cuts stresses due to gust loads, by allowing the wing structure to yield with the initial impact and gradually absorb it.

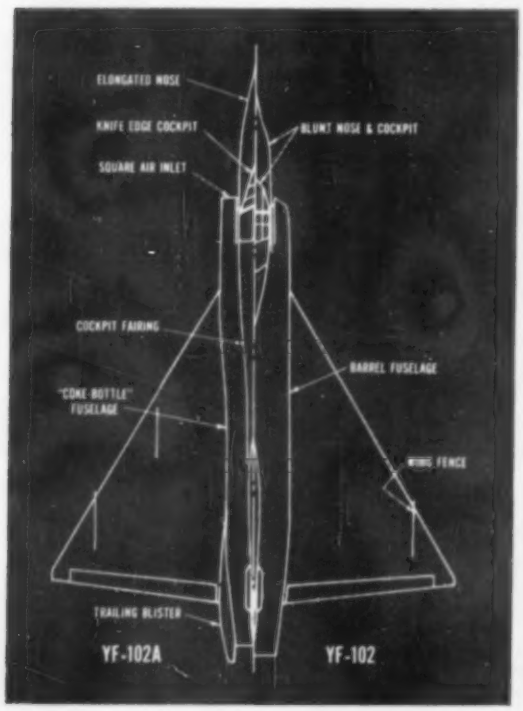
With the larger B-52B the wingtip deflection varies from 10 feet down to 22 feet up, or a total of 32 feet! It is almost impossible to have such flexibility in the vertical and still keep the wing rigid against twisting, so Boeing has supplemented conventional ailerons with retractable spoilers on top of the wing. These are raised to form a "fence" and destroy lift, causing the wing to drop—just as in the P-61, Northrop *Black Widow*, of World War II.

In contrast, the Russian *Bison*, four-jet heavy bomber, maximum speed about 600 mph, has conventional controls and large streamlined fairings at the wing tips. These have been described as mass balances to counteract poor torsional rigidity.

Recognizing that present limited knowledge of aerodynamics in the transonic region prevents foreseeing difficulties and correcting designs prior to flight test, the military in 1954 instituted the "Cook-Craiggie" plan. This plan limits production of new designs for approximately 18 months, during which time the early ships are extensively flown to find and eliminate bugs. At the end of that time either the design is ordered into large scale production or dropped. This procedure prevents large numbers of an airplane being produced before realization that troubles are insurmountable; and prevents a backlog of ships requiring modification before they can be placed in service.

In addition to the controls, a second major field—that of airframe aerodynamic design—has presented vast problems. Early refinements enabled current ships to inch a little closer to the speed of sound. A system widely used has been to change to a "thinner" wing or tail surface to delay shock wave formation, which accounts for much of the tremendous drag increase in the transonic region. The Lockheed *Starfire* was so altered in the F-94C. A little known, but very important F-86E modification occurred during the Korean War. North American extended the wing leading edge about 6 inches to increase its effective thinness and enable the ship to surpass the MIG-15's high-speed maneuvers. (*Continued on page 64*)

FIG. 2



Bemusedly having his tie clipped when he completed his first solo, a customer at Bill Bohlke's Spring Valley Airport in New York reflects the feeling of "belonging" which Bohlke has created so successfully among pilots at his field. The homelike atmosphere of the lounge, which is ideal for hanger flying, adds immeasurably to the customer's sense of welcome and to the pleasure of his flying.

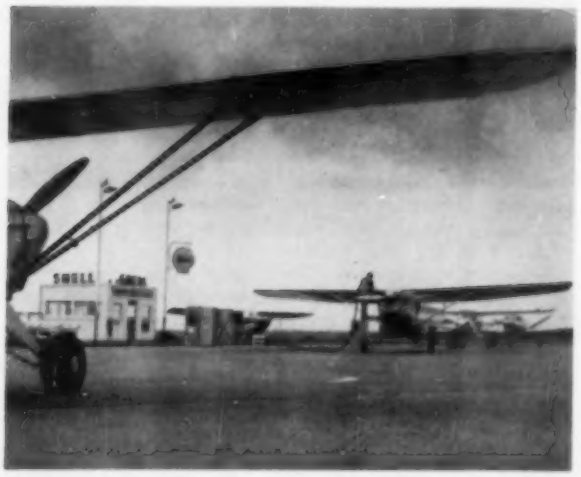
# *Ideas* FOR FIXED BASE OPERATORS

OIL COMPANIES long have known the value of exchanging successful merchandising ideas among their automotive service dealers. Realizing that merchandising tips could be equally valuable to their more than 400 airport dealers, Shell Oil Company has been carrying a series of aviation inserts in its publication, "Shell Progress", showing the service methods which Shell airport dealers have found pay off in better customer relations and thus increased business. Highlights from this series are presented here for the benefit of all operators.

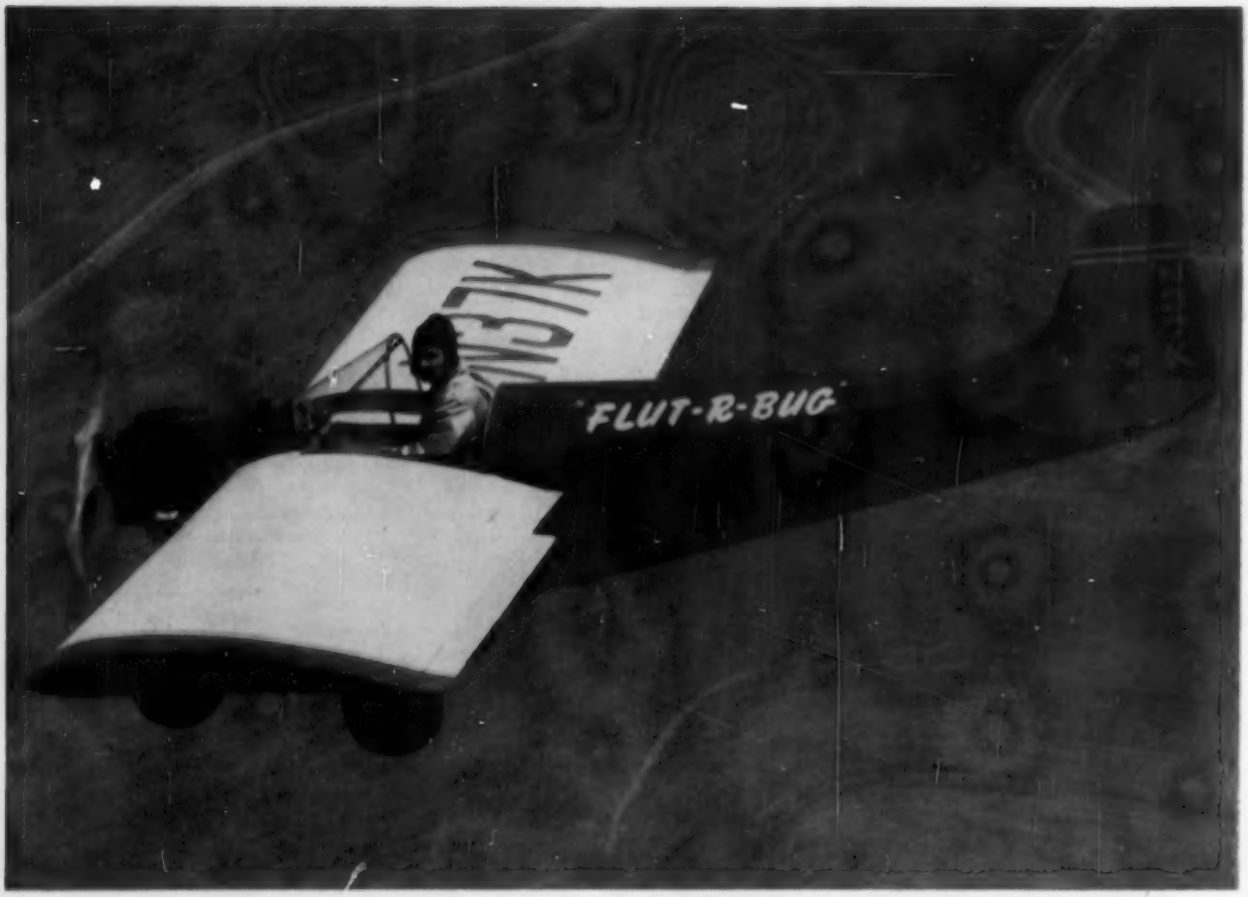
A ticket for free coffee is an unmistakable welcome to all visiting private aircraft at Monterey Peninsula Airport in California where the unusual cloverleaf hangers typify the neatness and efficiency of the operation and where everything possible is done to anticipate customer needs. A particularly thoughtful service is the packet of maps and route information given to all pilots going on cross-country flights.

Gadgets pay off in a big way, according to Bob Schmidt, manager of the Tucson Airport Authority in Arizona. Many pilots have come far out of their way to pick up one of the souvenirs they have seen some-place—yardsticks, king-sized paper clips, ash trays and other mementoes. One that has brought the sale of thousands of gallons of gasoline is the sign on the flight line reading, "Texas Passports Issued Here."

Practicing what he preaches, that "you can't sit on your fixed base and expect business to roll in . . . you have to develop every source of revenue around," Ted Dolhun started with 100 acres of woods and some old cabins at Lake Tomahawk in northern Wisconsin six years ago and now has an airport, seaplane base, motel, resort, riding stable, charter service, aircraft sales, and a year-round manufacturing business.



Believing that the automotive service station is the best layout for fast, efficient aircraft service, Fred Taplin, manager of the Hayward Airport in California, put one across the strip from the hangars, with the Shell emblem on a pole where it can be seen from all parts of the field. Another idea borrowed from automotive service is having everything needed close at hand to the service area including the cash box.




Prefabricated *Flut-r-bug* in flight. Note novel, but effective design of ailerons which extend four inches beyond trailing edge of wings.

FLYING's CHECK PILOT

**CHECK PILOT REPORT ON THE**

# FLUT-R-BUG

***Here is an inexpensive, easy-to-fly sport plane which can be purchased in kit form and built at home.***

**By DEAN McCARTY**

THOSE WHO HAVE been asking for an inexpensive sport plane, might well take a look at the *Flut-r-bug*, built by the Stits Aircraft Co. of Riverside, Calif.

A mid-wing, open-cockpit plane with a tricycle landing gear, powered with a 65 hp engine, the *Flut-r-bug* is available in both single and two-place models.

For those who wish to build their own, the basic kit for the single place model sells for $895, less engine and fabric. Total cost for the homebuilder runs about $1,000. If desired, Stits will provide a newly majored 65 hp engine with zero time since overhaul for $250.

Ray Stits has been building small aircraft since 1946. His Stits *Junior*, a low-wing plane with a span of 8 feet 10 inches, and his Stits *Skybaby*, a biplane with a span of 7 feet 2 inches have been centers of attraction wherever they have been shown. The *Skybaby* has a speed of 185 mph, but doesn't break ground until it reaches 60 mph—much too hot for the average lightplane pilot.

Enthusiasm for these planes led Stits to develop his SA3A *Playboy*, a low-wing sports plane powered with a C-85 Continental engine. Fully aerobatic with a top speed of 150 mph, you can get testimony from this amateur that it's a sweet aircraft.

"A lot of people," said Ray, "came in here for a look at the *Playboy* and left drooling. They just didn't have the money to lay out for a ship like that. But I think I've hit on a solution with the *Flut-r-bug*. It's built as in-

expensively as a plane can be built today, and still maintain the quality and safety desired by the average pilot."

"How easy is it to fly?" I asked.

"Anyone who can fly a *Cub* can fly the *Flut-r-bug*," answered Ray. "Would you like to try it?"

I had only 130 hours and had never flown a tricycle-geared ship, so I was a little doubtful about checking out in a single-place aircraft.

"Nothing to it," said Ray. "Just touch down on the main wheels and forget about the nose gear."

After the "brake and blast" tactics I was accustomed to in conventional geared ships, taxiing the *Flut-r-bug* was like a dream. Very slight pressures on the rudder bar (not pedals) is required to keep the ship under control. The instruments in the ship I flew were nicely arranged, although instrument selection in the kit is up to the discretion of the owner.

At the end of the runway I lined her up and let her go. Acceleration is rapid—at least twice as fast as in the 65 hp lightplanes we're used to today. I held her on the runway longer than necessary since I wanted plenty of speed in my first take-off. When I did ease back on the stick, she ballooned skyward as if a jato bottle were hung beneath her fuselage. Climb-out was at 60 mph and while there was no rate-of-climb indicator aboard, the 1,000 feet per minute claimed by the manufacturer seems pretty accurate when checked against a watch.

The *Flut-r-bug* is sensitive on the controls and over-control is likely unless one has been forewarned, but once a pilot becomes accustomed to them, the plane is a delight to fly.

The airspeed indicator hung at 85 mph at cruising rpm and in slow flight she'll stay in the air at 45 mph. At 37 mph, she started to stall. There are no shudders, but plenty of mushiness to warn that a stall is approaching. In a full stall there is no tendency to drop off on a wing—

The *Flut-r-bug* on the flight line. Note sturdy tricycle landing gear which makes taxiing easier and affords greater visibility to the pilot.

the nose came down across the horizon and the plane began to fly immediately. My first landing approach was under power at 1,600 rpm at the recommended 65 mph, crossing the fence at 55, and touching down at an indicated 40 mph.

The second time around I began to realize what a remarkable ship this really is. It is stressed to carry an engine up through 90 hp and, with that many horses, ought to go like a bomb.

The *Flut-r-bug* is licensed under Civil Air Regulation 174-3 governing amateur and home-built aircraft. In kit form the fuselage and tail surfaces, which are of chromoloy tubing, come welded and primed. The wings, constructed of spruce spars and plywood ribs, come assembled and varnished. There is no welding, riveting, nailing, or gluing for the home-builder. All he must do is cover the aircraft with fabric and assemble.

**STITS "FLUT-R-BUG"**
Model SA-5A

| | |
|---|---|
| Wing span | 23 ft. |
| Length | 17 ft. |
| Engine | 65 hp. Lyc. |
| Wing area | 103.5 sq. ft. |
| Top speed | 100 mph |
| Landing speed | 40 mph |
| Fuel | 9 gals. |
| Service ceiling | 12,000 ft. |
| Height | 70 inches |
| Net weight | 450 lbs. |
| Power loading | 10.4 lbs./hp |
| Wing loading | 6.4 lbs./sq. ft. |
| Cruise speed | 88 mph |
| R/C | Over 1,000 fpm |
| Range | 200 miles |
| T/O & landing | 200 ft. (average) |
| Maximum baggage | 25 lbs. |

One feature which will appeal is the removable wings that allow the *Flut-r-bug* to be stored in a garage—thereby eliminating tie-down and hangar fees. Wings fit neatly into racks alongside the fuselage for towing. The plane is towed tail first on its main gear, the nose wheel riding clear of the road. Attaching or removing the wings is a ten-minute job, accomplished by inserting three bolts and attaching the struts. Ailerons work by push rods so there are no rigging problems.

Stits purposely made the wing installation a quick and easy process.

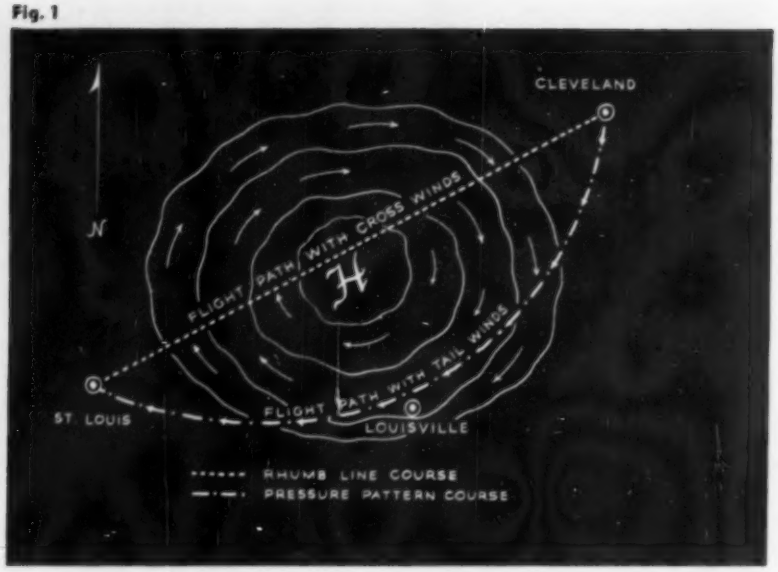
"On a folding-wing job I built," said Mr. Stits, "the wings were locked into place by the simple action of shoving a lever home and closing a door near the wing root. It was so simple that every Tom, Dick, and Harry on the flight line was demonstrating it to his friends and forgetting to shove the lever home again. Several times pilots came back to the plane only to find the wings unlocked as they started to taxi out to the runway. This way it's still simple, yet enough of a chore to prevent slip-ups."

For those who want to dress up this ship, a bubble canopy, wheel pants, propeller spinner, and streamlined cylinder cowlings may be had as optional equipment.

The ailerons on the *Flut-r-bug* (*Continued on page* 82)

Wings are easily removed and secured on wing racks at each side of fuselage. Tow bar is attached to fittings on the empennage and the nose gear is raised to clear ground while plane is towed along road.

Fig. 1



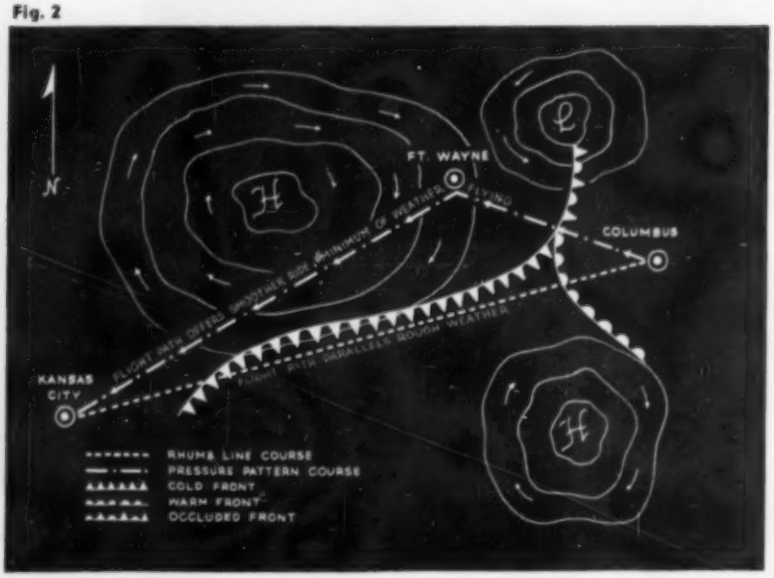
THE PRO'S NEST

# PRESSURE PATTERNS AND WEATHER

*A new technique of flight planning offers greater safety, economy and pleasure by "riding the tailwind".*

By TOM DENNY

Fig. 2




1

The basic idea of pressure pattern flying.

2

How the author made the most of pre-frontal activity along his proposed flight path and "rode the tailwind."

3

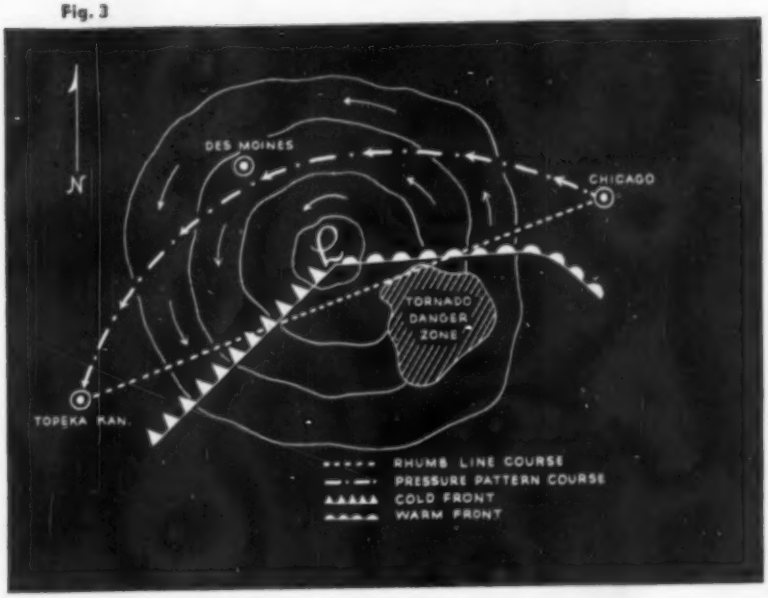
How to utilize the conditions encountered in a low pressure cell.

IN ADDITION TO the advantage of faster ground speeds, smoother rides, and lower cross-country costs resulting from pressure pattern flight planning, I've found it also solves some of the problems of weather flying.

In several cases where fronts would normally have canceled or postponed a flight, pressure pattern flying allowed me to proceed and make my destination close to schedule.

This technique has wide application for the executive pilot on a long-range hop and the private pilot whose airplane is equipped with auxiliary fuel tanks. By thinking in terms of pressure paths, pilots may find a choice of courses offering speed, safety and comfort. To better discuss this technique and see how it is applied to weather, a glance first should be given to Fig. 1 which depicts the basic idea. Keeping in mind that in the Northern Hemisphere the winds spill out of a high pressure cell in a clockwise motion and pour into a low pressure area with a counter-clockwise motion, it is easy to see that a flight can be planned to "ride the tailwind" for most of the trip.

Fig. 3




Though the full advantages of such flight planning are best realized at altitudes around 25,000 to 30,000 feet, and over long ranges, I have found definite advantages at the lower altitudes (5,000 to 12,000 feet) and on flights as short as 400 miles.

For instance, when flying the pressure pattern track shown in Fig. 1, I saved almost an hour in time even though I had flown more miles. As can be seen the rhumb line course encountered crosswinds while the pressure pattern course "rode the tailwind."

It was while flying cross-country on pressure pattern planning that I realized how it can also be applied to avoid weather. My interest was aroused one day while watching weather radar. A cold front was moving in on Lockbourne Air Force Base, located just south of Columbus, Ohio. It was enlightening actually to see the extent, movement and make-up of the front; *to find that a high pressure area with excellent flying conditions followed immediately behind the line of weather activity.*

With this picture retained in mind, I began to apply the idea to flights facing weather. Take, for example, a flight planned one day from Columbus, Ohio, to Kansas City in a *Tri-Pacer* 135, equipped with an auxiliary fuel tank. When checking the weather that morning around 8 a.m. (see Fig. 2) the situation looked rather hopeless for following a rhumb line course.

As shown, I would have to fly through a warm front and then be at the mercy of turbulent pre-frontal activity for some 500 miles. All this plus going through the cold front itself as a climax.

Such a flight in a lightplane is out of the question from the standpoint of safety. If I waited for weather to move past Columbus, I could not take off until after dark, the weatherman forecasted. With an appointment for 4:30 p.m. at Kansas City, it first appeared that I would be obliged to cancel my flight for that day.

However, in checking the map at closer range, I saw that in accordance with the rule of thumb, a high pressure cell with CAVU conditions existed in trail. Also the map showed that the cold front met the warm front near Lima, Ohio, and then combined to form an occluded front which tapered off to the north.

With pressure pattern flight planning in mind, I then decided to fly from Columbus to Fort Wayne, contacting the front at Lima, Ohio, en route. Once reaching Fort Wayne and establishing my position in the high pressure cell, I would swing southwest and ride the tailwind "downhill" to Kansas City.

With such a plan established, I climbed into the *Tri-Pacer* and fired up the Lycoming. It was 8:30 a.m. when I lifted out and picked up a heading of 308 degrees.

My reason for approaching the front via Lima, lay in the fact that my course would thus enter the weather line at a right angle and give me less exposure to frontal activity. My plan called for flying as close to the front as conditions would allow safely and then landing and sitting out the passing of the front while securely tied down at an airport. As soon as the center of the front passed, I would untie the *Tri-Pacer* and continue on my way.

So, it was with careful observation of the deteriorating conditions that I proceeded on course. The *Tri-Pacer* made the 87 miles to Lima in 45 minutes, and as I approached the front, thin nimbostratus clouds and light rain appeared. Lying low on the horizon was a darker layer of nimbostratus and in the background were towering cumulonimbus.

Findley Radio advised that the front was reported 10 miles northwest of Lima and moving at approximately 10 mph. Soon the rain became heavy and the *Tri-Pacer* bobbed about. I knew I had penetrated as far as I safely could, so sat down at Lima airport.

The front swarmed over, approximately an hour later. From the inside looking out, it was a comfortable feeling to watch the lightning and pelting rain with only casual concern.

After 45 minutes, the rain slacked to a drizzle. Overhead lingered the tail end of a cumulonimbus, but the brisk wind gusts had diminished, visibility was two miles and improving rapidly, and the ceiling was up to 1,100 feet. To the northwest—the direction I intended to travel—the sky was growing brighter as the sun backlighted the passing front. Under such conditions, it was safe to proceed. The *Tri-Pacer* was wound up and headed into the wind. I did notice, upon reach- (*Continued on page 70*)

*To be sure of having information at your fingertips as the need arises, it's smart to make your own* **FLIGHT HANDBOOK**

By HARALD H. PROMMEL

ASSUME YOU ARE flying over a rugged, sparsely-populated area. Some odd shapes on the ground suddenly attract your attention. They look like this:



You recognize them as being man-made. Are they markers? They don't point anywhere in particular, and if they are markers, what do they mean?

By now they've passed beneath your airplane; one of two things happens. You pass them off as something interesting and unexplainable and forget them—or you take immediate action.

Do the former and you have possibly committed unintentional murder.

Act at once and you will have saved a life, for the markers you saw were the international ground-to-air distress signals meaning "Aircraft Seriously Damaged" and "Require Doctor: Serious Injuries."

Or assume that your radio has failed in flight and your destination is a controlled airport. Do you remember your light-gun signals? Will you understand the tower's instructions? Or will you become an unintentional hazard to other pilots in the area?

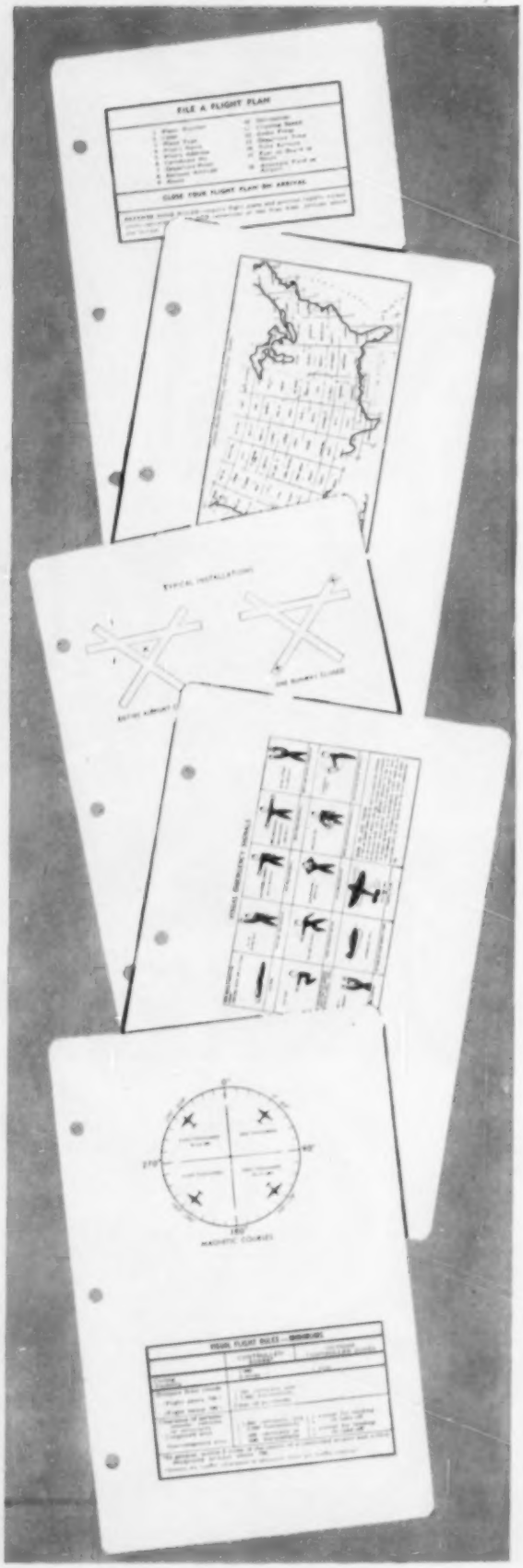
The point is that, within the course of a normal flight, any number of unanticipated situations can arise which might affect your safety or the safety of others.

The CAA has a rule, regulation or procedure to cope with any one of these situations. Your problem is to know where to find the answer—*fast!*

Sure you knew the answers when you took your flight test, but since then you may not have had to use the information. Human minds have a way of getting rusty. So a situation arises, and you need an answer. You might look in your CAR manual—if it isn't lying at home on the desk. You might find it on the back of your aeronautical chart—if you're carrying one.

Or, you can make your own flight handbook and be sure of having the information at your fingertips when you require it! All you need is a dime store notebook and an index tab or two. Then start collecting information. It can come out of magazine articles, notes made from talking with other pilots, etc. All you do is paste it into your notebook.

You can have, for instance, (*Continued on page* 84)

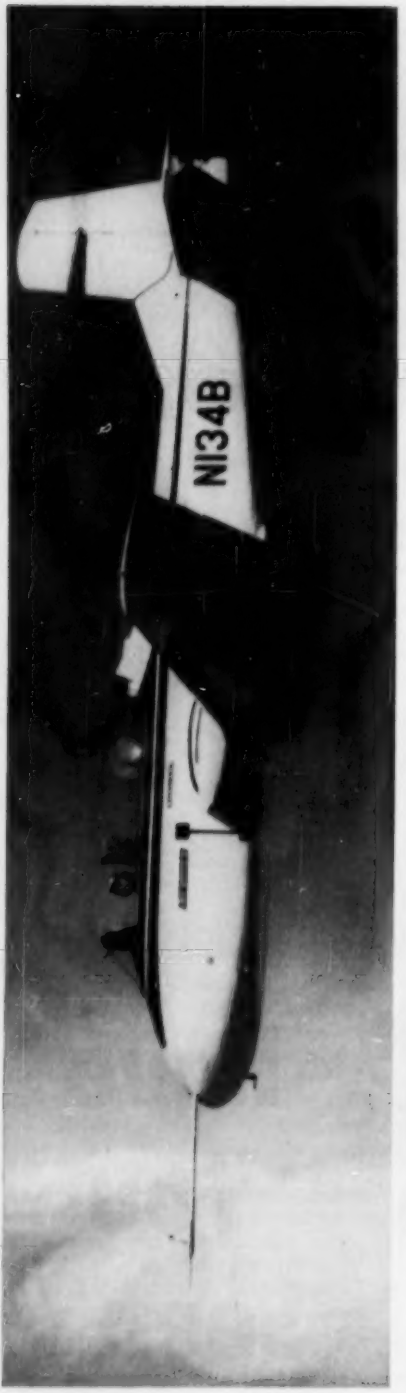


**F-104 STARFIGHTER** Acclaimed "the world's fastest fighter," but with its top speed still under security wraps, Lockheed's ultrasonic razor-winged streak of fighting power, the Air Force F-104 *Starfighter*, is powered by a General Electric J79 engine. The thin, straight wings measure only 7½ feet from fuselage to tip and the leading edges are so sharp they must be covered with felt sheaths to protect ground crewmen when the plane is not flying. The wings' down-droop is an aerodynamic design technique enhancing precision control of the high T-shaped tail which has no elevator, the horizontal stabilizer moving as a whole unit. Lockheed's chief engineering test pilot, Herman R. "Fish" Salmon, is shown below with the ship. Note the special covers concealing engine air scoops on each side, just forward of the wing, for security reasons. In the photograph above, the prototype model is shown in flight since no close-up in-flight pictures of the production model have been released. Dimensions are: Height 13 ft. 6 in.; length 54 ft. 9 in.; span, wingtip to wingtip 21 ft. 11 in.

# Have You Seen?

CONTINUED ON NEXT PAGE

**DUAL ENGINE** Left: Currently under study as one of a number of pure research projects at Piper Aircraft, Lockhaven, Pa., is this dual-engine *Tri-Pacer*. The dual installation involves two Continental 90 hp engines, driving seperate propellers, with the shaft as the only vital part common to both powerplants. The top engine is inverted, the lower in normal position. No production of the experimental plane is contemplated.




## DOWN

With a diving speed of 500 mph, Beechcraft's highly maneuverable Model 73 *Jet Mentor*, with test pilot Tom Gillespie at the controls, streaks down in this striking picture taken by chief photographer Jim Yarnell of Beech Aircraft from a propeller-driven Beechcraft T-34. Due to the difference in cruising speeds of the 173 mph T-34 and the 245 mph Model 73, pilots of both planes and the photographer had to co-ordinate their maneuvers to split-second timing.

## TEMCO JET TRAINER

Above: Now undergoing flight tests, Temco's Model 51 primary jet trainer made its first flight in March. A two-place, tandem, mid-wing, all-metal plane with retractable tricycle gear, it is powered by a Continental J-69-T9 turbo-jet of 920 pounds static thrust. Maximum level flight speed ranges from 285 knots at sea level to 300 knots at 15,000 feet. Service ceiling is 35,000 feet and cruise speed is 215 knots at 25,000 feet. Endurance at sea level with normal fuel is 1½ hours. It stalls at 60 knots at normal landing weight, flap and gear down.

## COUGAR VERSIONS

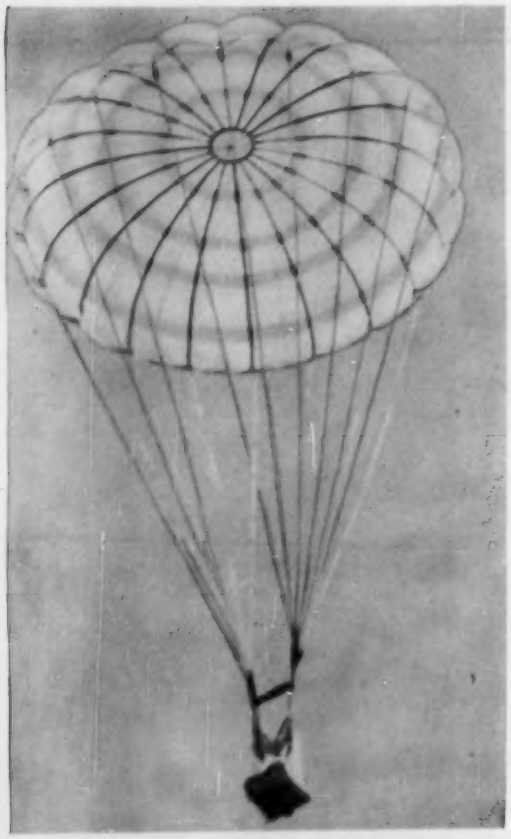
Above: Navy's new Grumman F9F-8T *Cougar* is a two-place fighter-trainer armed with two 20 mm cannons and capable of carrying a wide variety of external stores. Below is a photo-reconnaissance version of the *Cougar*, the F9F-8P, which can fly non-stop across the United States in less than four hours and photograph a continuous ten-mile-wide strip of the terrain below. Designed and manufactured by Grumman Aircraft and Engineering Corp., Bethpage, L. I., N. Y., the F9F-8P is now in fleet operation.

**CONVAIR JET TRANSPORT** Above: The *Skylark* 600, Convair's entry in the jet transport field, will be a medium-range, four engine plane designed to operate from 5,000-foot runways and have a cruising speed of 609 mph. The swept-wing *Skylark* will be powered by the new General Electric CJ-805 jet engine, commercial version of the famed J-79 military jet. First class versions will carry 80 passengers in four-abreast seats, while the coach versions will carry 99 in five-abreast seating. Fully pressurized, it will fly at 40,000 feet. Deliveries of the $3,300,000 planes are expected to start early in 1960

**1956 AMPHIBIAN** Above: Equipped with Edo Model 2700 amphibious floats the new Cessna 180 is equally at home on land or water. Landing gear consists of two main wheels mounted aft of the float's step and retractable into the wheel wells. The full-swivelling nose wheels retract upward and outward. Powered with a 230 hp Continental and thus equipped with amphibious floats, the 180 has a cruising speed of over 135 mph.

**UP**

Literally reaching for the sky in this dramatic photograph, the new high performance Beechcraft *Jet Mentor* demonstrates its outstanding maneuverability as it prepares for a tour of military bases and further flight evaluations by the armed forces. During the spin phase of its factory testing, the plane was spun up to 105 turns in one day, with as many as 11 turns in one test, and at all CG configurations and inverted. All spins were normal and safe.



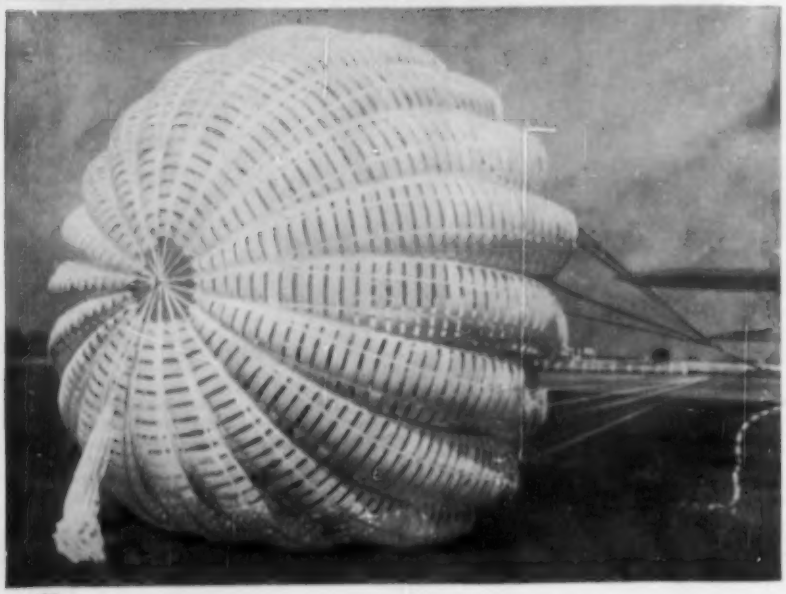
A 16-foot diameter ring slot canopy parachute which is used as a parabrake or landing approach drag chute for jets.

SINCE JEAN PIERRE BLANCHARD claimed invention of the parachute in 1785 and Jacques Garnerin made a 3,000 foot drop in 1795, the aerodynamicist has done wondrous things to the old bumbershoot. Variety in fabrics, design and application have kept pace with utilitarian demands. In Russia and France a great sportsman cult has grown up around the precision use of chutes. For the first time a team from the United States will participate in the annual international meet.

Originally a life saving device—the parachute has countless thousands of "saves" to its credit—the chute has extended its utility to such uses as braking power for high speed landings; spotting of heavy cargo; restocking of inaccessible areas with game and fish; forest fire fighting and rescue work. From being an emergency tool the parachute has become a workhorse of the air age—dependable, essential.

# Going Down!

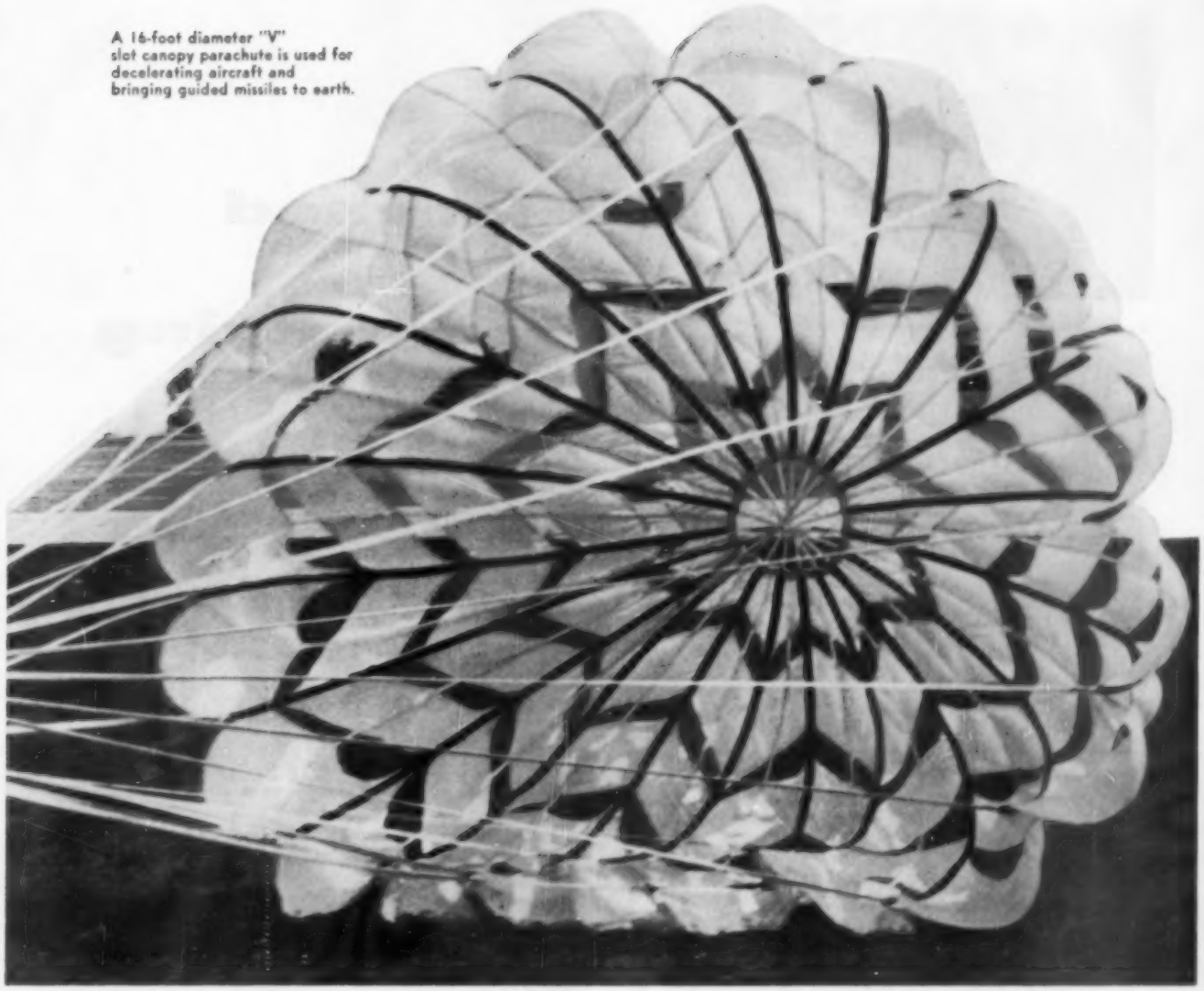
Left: Paratrooper is aided in releasing his parachute after making safe landing during "Exercise Long Horn."



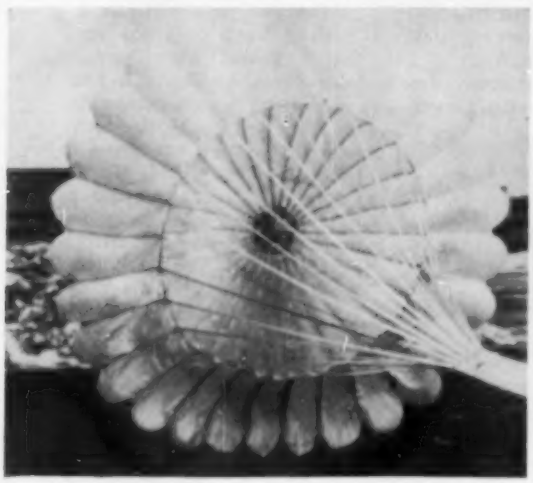
Left: A 16-foot fist ribbon chute employed on a Lockheed F-94 *Starfire* was the first parabrake used in the United States.

Above: A ribbed guide surface parachute used for the stabilization and deceleration of bombs, mines and guided missiles.

A 16-foot diameter "V" slot canopy parachute is used for decelerating aircraft and bringing guided missiles to earth.



This 10-foot diameter guide surface parachute was designed for missile recovery due to its excellent stability.



This 24-foot diameter slotted extended skirt canopy parachute is used as a troop or personnel chute.

Parachutes stored in drying room. Every six months all chutes should be unpacked, aired and repacked.

Removing the *Cruiser's* wings and hauling it out of the Muskeg.

No. 197

# I learned about flying from that !

*The author learned an expensive lesson down in the bush 1,500 miles from home.*

By GEORGE EAGER

FRED EICHE AND BILL BURKE knew full well what would happen when they started to discuss tackle for a week of fishing in Canada.

Didn't they think it would be a good idea to take my family *Cruiser*?

They thought it would be. We'd fly to Lac La Ronge, Saskatchewan, where our fortunes would be up to Lindy, the outfitter, and his Indian guides.

None of us ever had taken a 3,000-mile trip in a lightplane, so we went to work on detailed plans and arrangements, securing the necessary sectional charts and studying them carefully. We talked to fishermen who had made the trip the previous week, getting information on customs and airports of entry. There were no high elevations to cross and we could follow airways nearly all the route; in fact, one could sit down almost anywhere in populated country. Airports and facilities were good. From Prince Albert to La Ronge we would be over bush country, but if we stayed close to the road we could land on it if necessary.

La Ronge had an airstrip serving a DC-3, so there should be no difficulty for us. We studied the airplane's weight and balance figures carefully, and weighed ourselves and baggage to be sure we'd be within safe limits. The engine had less than 100 hours since a top overhaul. Of course, it was using a quart of oil every hour, but it always had done that without giving trouble.

We took off from Lincoln, Neb., on a June Saturday morning about daylight. Two and a half hours and 240 miles later, we landed at Huron, S. D., for gas and breakfast. Weather was reported good ahead, but we had a 1,500 foot overcast going into Bismarck, N. D., where we stopped to stretch. At Minot we cleared customs and played tag with scattered showers en route to the big airport at Regina, Saskatchewan. It was now 4:00 p.m., but Canadian officials reminded us that we had daylight until nine o'clock.

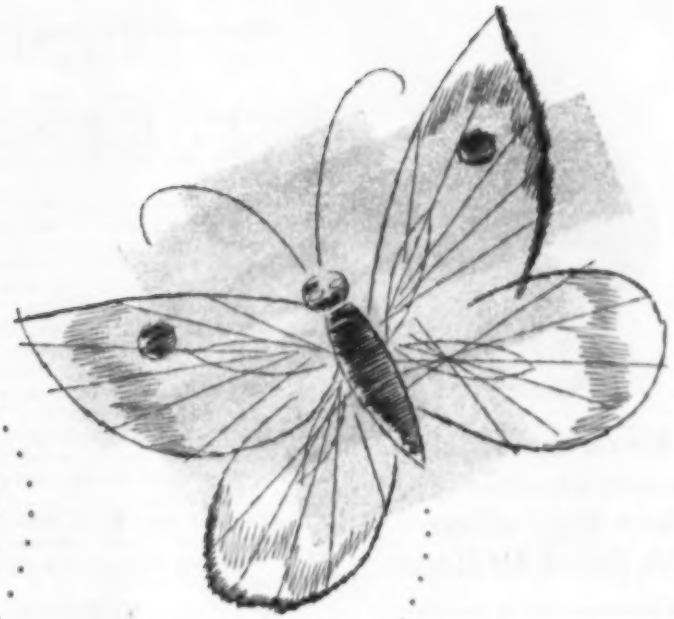
The author and his *Cruiser* at Prince Albert, Saskatchewan, before flying over the bush country for fishing at Lac La Ronge.

North of Regina we followed the railroad tracks into Prince Albert, the last stop in "civilization"—nothing from there to La Ronge, but bush country. We wanted to stop here for a complete servicing anyway and, since weather was now not too favorable, we decided to spend the night and fly the last 150 miles next morning.

We had covered 1,100 miles in 12 hours of enjoyable flying and were sold more than ever on lightplane vacation trips when we saw fellow fishermen from Kansas and Nebraska pulling into town dirty, exhausted, and red-eyed from 30 hours of continuous automobile driving.

Next morning dawned with a hazy sun and dark cumulus moving in from the northwest. There are no weather or airways communications at La Ronge, but the Saskatchewan government maintains a radio there for the Mounted Police, fire service, and general contact with the rest of the world. To accommodate aircraft flying to La Ronge, the weather station at Prince Albert will call La Ronge Radio. Apparently this particular morning the radio operator didn't get any rain in his face as he stuck it out the window, so the report came back that flying weather at La Ronge was good.

We took off in sunshine but soon (*Continued on page 78*)



LIGHT FOR FLIGHT

# ARC's new ADF weighs less than 20 lbs!

**TYPE 21 ADF WEIGHS ONLY 19.7 POUNDS**

Component Units Weights: Receiver, 6.8 lbs.; Loop, 4.3 lbs.; Loop Housing, 0.5 lbs.; Control Unit, 1.6 lbs.; Indicator, 1.3 lbs.; Power Unit, 5.2 lbs.
*CAA Type Certificated*

Fly light and navigate . . better than ever before!

ARC's miniaturized Automatic Direction Finder is making aviation news. It offers *reliability* proved in two years of testing. The entire system weighs less than 20 pounds. Now you can have a DUAL installation where required—at a weight saving of 80 pounds or more.

The ADF still is the world's Number One navigational aid, usable on an estimated 60,000 radio stations. Now you can have ADF featuring ARC standards of performance and reliability. This system incorporates hermetic sealing of critical components such as the entire loop assembly. It also has other mechanical features designed and tested for dependability under today's higher speeds and more exacting operational and environmental conditions.

The Type 21 ADF covers all frequencies from 190 kc to 1750 kc. It requires less power—only 2.8 amps at 27.5 volts dc input. Extremely low drag of the loop is an outstanding feature. Housing extends only 2 inches from the skin of the aircraft.

Now make room for more payload and other equipment. Fly with ARC-reliability, less weight, less space, less drag. Ask your dealer for complete details.

Omni/ILS Receivers • Course Directors • UHF and VHF Receivers and Transmitters
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**Dependable Airborne Electronic Equipment Since 1928**

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**Aircraft Radio Corporation** BOONTON, NEW JERSEY

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Please send me your booklet that tells me how I can become a Flight Officer with United Air Lines.

*Name*.....

*Street*.....

*City*.....*Zone*.....*State*.....


## Mission to Barcena

*(Continued from page 30)*

ations Duty Officer, runs a finger over your flight plan and draws a long breath. "Stretching your luck, aren't you, boys? Will that blue heap defy gravity as long as it says here?"

You explain about topping off on the runway, and Charley nods, but he scrawls his signature on the plan slowly.

"Don't forget your hourly report to Overseas Traffic Control. We have to alert SAR if you're 30 minutes late."

"Make it 15, pal," you tell him. "That Able Jig won't float worth a whistle."

Aviation Machinist's Mate 1/c Manuel Rojas and Chief Photographer's Mate "Red" Hagerty, your aircrewmen, have been out checking the plane long before you arrive. Rojas' strong, white teeth flash a smile of pride as he reports the aircraft ready for flight.

"Wave to your relatives in Tijuana as we go by, Rojas," Scotty advises him. "That's the closest we'll get to a place to land until we get back."

"I got no relatives in Tijuana, sir, but we better get back, 'cause Hagerty wants to make a liberty down there tonight."

"All I want to do tonight," says Hagerty, "is run this film through the soup and have it come out with volcanoes on it. I never did see a volcano."

Spasmodically graceful gestures of the taxi signalman help you slew the big photoplane around and onto the taxiway. Scotty copies your ATC clearance on the way out, then sings out the 120-odd items on the pre-flight check list. You check mags, cut engines as planned. Rojas, Hagerty, and the fuel detail pack the last possible drop of gas into the tanks, and you're ready for restart and take-off.

"Miramar Tower, Navy 28054 ready to roll."

"Roger, 28054. Miramar GCA standing by this frequency to monitor your departure. You are cleared for take-off."

In position, you shove the jet throttle forward to the stop. While the jet builds its screaming crescendo, you advance the recips in stages to keep the plugs clean. Your straining monster quivers, wings eager to bite the air. A glance at the instruments, another down the runway. Fog makes the receding double line of lights dance vaguely. Ceiling 300 feet, visibility one mile, said aerology. Mile, shmile, this is an ITO. Back to the old gauges, release the brakes. A brief rumbling and bumping, and then the ever old, ever new and thrilling feel of being airborne again.

"Navy 28054, this is Miramar GCA. Have you in radar contact. Continue present course to on top, report reaching on top."

Suddenly the murky half-world of predawn fog is gone, and you break out into the pristine glory of a California sunrise seen as only the airman can see it. Red-gold light dapples the tops of the early morning stratus which hugs La Jolla and Mission Bay, reluctant to relinquish the land to the sun.

Scotty reports on top and on course as you tip over to initial heading. Rojas reports conditions normal, and Hagerty requests, and gets, permission to send the CW out-report. You reach cruising altitude, level off, and secure the jet with a series of rapid movements. Quick readings of the fuel flow and quantity gauges give you the fuel used on mag check, take-off, and climb. Subtracting the sum from fuel on board before starting engines gives you fuel available at the beginning of cruise phase one. This procedure will be repeated each time you change power settings, and the results plotted on the howgozit. "Actual" must equal or exceed "predicted" fuel remaining, or you'll be in trouble.

Scotty breaks out the sextant for a sun line, for the stratus bank below precludes flying a wind star or getting a visual fix on the coast. Scotty's EP from the sun shows a normal estimated ground speed, the engine instruments are steady,

*(Continued on page 57)*

"This your first jump?"

# "IF WAR SHOULD COME,"

military officials
have declared, "battles
could be won or lost
on the radar-
scopes of our early-
warning planes...
and their mission
would change
from sentry duty
to that of combat
command post."

With each ominous technological advance in aerial warfare by potential aggressor nations, the maintenance of a round-the-clock early-warning system becomes increasingly vital. That's why the USAF's RC-121D and the U. S. Navy's WV-2 SUPER CONSTELLATION sister ships—distinguished by huge radomes atop and below the fuselage—have been flying day-night surveillance missions in all kinds of weather, around the calendar.

Carrying 6 tons of radar gear, these Lockheed SUPER CONSTELLATIONS are pressurized and air-conditioned to provide 75-degree cabin comfort, for a 31-man crew, when outside weather is minus 60. Powered by four Wright 3250-h.p. turbo-compound engines, these picket patrol veterans operate at altitudes over 25,000 feet, if necessary, and at speeds up to 300 mph.

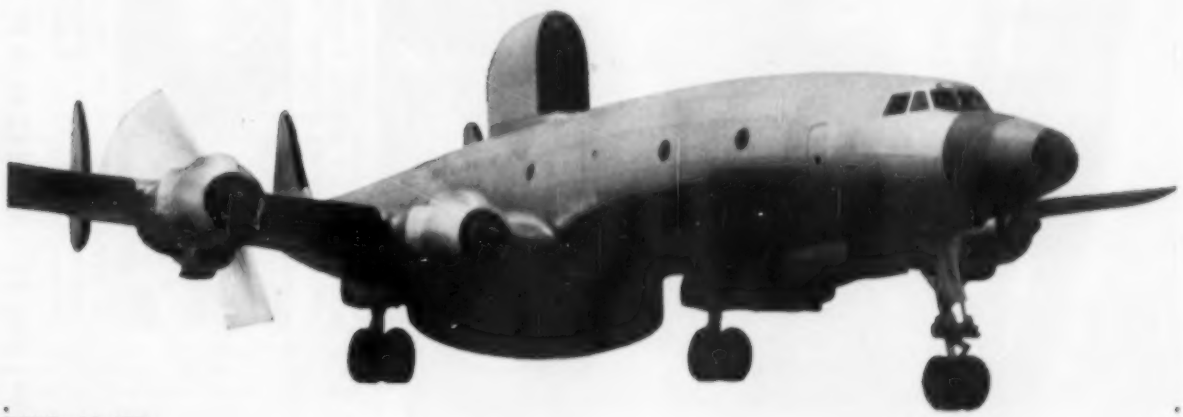
Lockheed developed the antenna reflector assembly in the belly-radome. (From an altitude of 10,000 feet an RC-121D or WV-2 can radar-scan an area of 45,000 nautical square miles.)

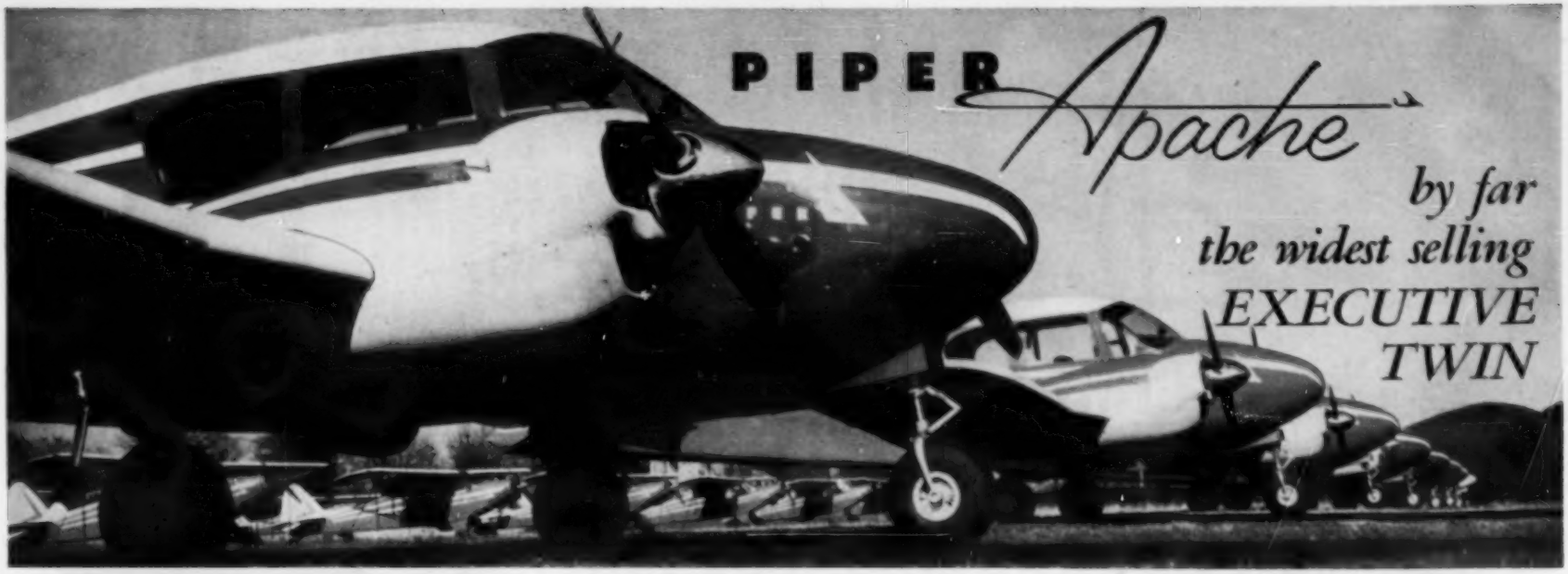
Only Lockheed produces long-range early warning radar planes—a tribute to the SUPER CONSTELLATION's famed dependability and to Lockheed's leadership in long-range patrol aviation.

Lockheed

AIRCRAFT CORPORATION, BURBANK, CALIFORNIA

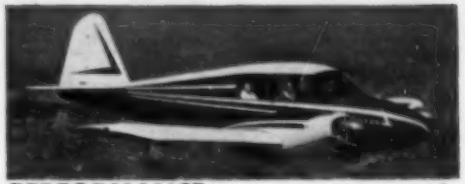
*Look to Lockheed for Leadership*





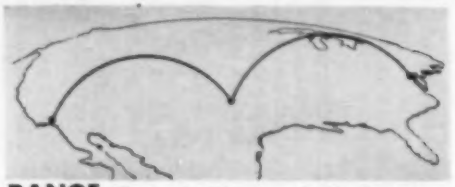
**COMFORT** Quiet, roomy cabin with picture window view and superbly comfortable seating with either standard or optional reclining seats.

**CAPACITY** Carry five if you wish for shorter trips. Plenty of room for three on adjustable rear seats plus baggage.



**PERFORMANCE** 170 mph cruise at 75% power; 52 mph stalling speed lets you use any airport. Excellent single engine performance.

**ECONOMY** $21,000 less than any other new production twin available. Correspondingly lower operating cost. $34,000 for standard model.



**RANGE** Up to 1,200 miles (eight hours) at economy cruise with 108-gallon capacity, standard tankage in Super Custom Apache.

**RELIABILITY** Built to highest standards, proven in millions of miles of use; powered by two Lycoming 150's—the ultimate in reliability.

**PIPER AIRCRAFT CORPORATION, LOCK HAVEN, PENNSYLVANIA**

(Continued from page 54)

the air is smooth, so you unpucker a bit, lean back, and pass the word: "The smoking lamp is lighted."

The relaxing aroma of fresh tobacco smoke fills the cockpit. Rojas has unlimbered the hot-cup, and the steaming soup he hands you tastes like the first course at Antoine's. Tiny rifts appear in the stratus deck beneath, and you begin to feel optimistic about the rest of the hop. Between sun lines, Scotty tells a couple of jokes he heard at a party. Hagerty asks permission to go aft to check his cameras, and everyone's ears pop as you depressurize to let him through the compartment door. He comes back, reporting camera windows clear and equipment all in order. Scotty gives you a position report and you hand it to Hagerty to send to OATC. Hagerty gets a Roger for the message and you bore along, trading fuel for miles, miles, miles. . . .

The appointed number of hours and minutes have passed for you to be making your landfall. The ocean below is clear of clouds now, and up ahead there is only faint haze. Where is San Benedicto? Rojas taps you on the shoulder, points firmly ahead. An island! On course, on time. You exchange satisfied winks with Scotty. Hagerty pays the compliment of the raised hand, index finger and thumb touching. Nobody says anything. Now the work begins.

The howgozit shows a safe margin as you drop to 1,500 feet for the first oblique camera run. The camera doors open, the ready lights go on. Hagerty monitors the control panel and the exposures tick off steadily on the intervalometer. Light conditions are perfect for photography. Busy holding heading, you barely glimpse the target. What you see, though, tells you the island is no place for a forced landing. Rocks, and more rocks.

"Cameras off!" snaps Scotty on the intercom. You hump your shoulders to get the knots out, and unglue your eyes from the compass heading.

Turning a knob with your left hand, you speak into your own mike, "Cabin compressor off, shut the camera doors."

"Camera doors closing," responds Scotty. Now you line up for your next run. This pile of rocks is smoking! There's a volcano there, sure enough, but you haven't time for sight-seeing. Your eyes clamp back on the compass as Scotty barks, "Camera doors opening."

The second run ends, and your left hand turns the compressor on as soon as the camera doors close again. At the same time, you are running through the jet start check-off list, banking the big Able Jig left for the climb to 20,000, and putting on your oxygen mask. Lighter now than at take-off, the plane climbs eagerly, surely.

"Splut-chug!" Four hearts stop momentarily as the port recip falters in its climbing drone. They beat again, but faster, as the engine resumes its familiar mournful yammer. A rapid but thorough instrument check shows everything normal, no apparent cause for alarm. You level off at altitude, secure the jet, set the recips

(Continued on page 60)

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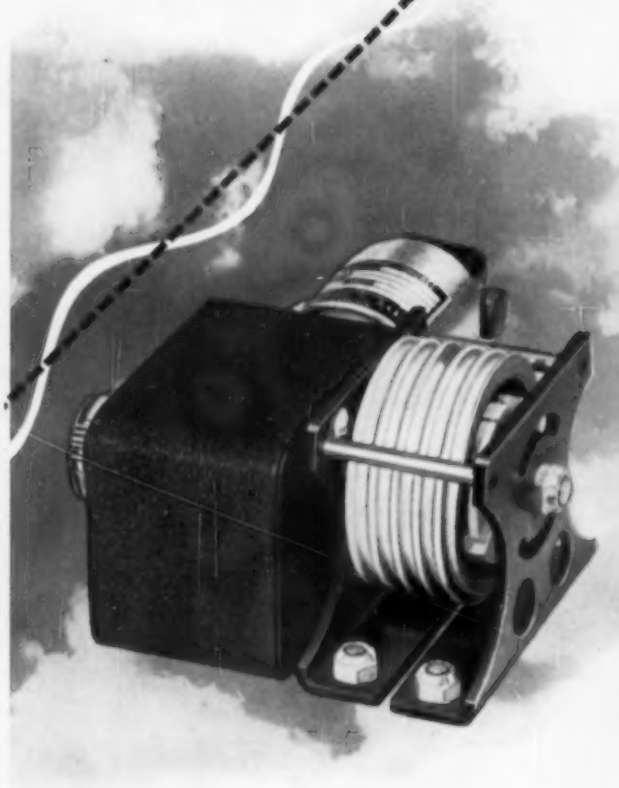

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*(Continued from page 57)*

at cruise, swing north for your vertical run. Conditions still normal. But everybody knows it; the port engine *did* burp in that climb.

Cruising at 20,000, you feel a little better. Even if the left engine should fail, you still have the starboard recip and the jet. On them, your fuel remaining will get you to the Mexican coast, where you can ditch dry. No field in that area will take your weight, but land is better than water.

There's no time to sweat it, though, for your vertical run is beginning. A very expressive cuss-word from Scotty swings your head toward him.

"Clouds!" Scotty moans. "Right on target."

Scripps needs pictures of clouds like a Penguin needs a bathing suit. "How are they moving?" you ask.

"Right to left, pretty fast. We could make a couple of 360's and they'd be out of the way."

Can you spare the gas to orbit, waiting for the clouds to clear? Your howgozit is exactly on the line. One turn will put you in the red. Of course, you might lean out manually on the way home, maybe pick up a tail wind, maybe Miramar will be VFR when you get back. Maybe or no maybe, it's a long way to come to do half a job. So you decide.

"Stand by to pick up the flight line out of the second turn. We'll orbit."

The clouds pass. Scotty hits the flight line right on the button. At the end of the run, you snap off the compressor as if it were hot, the camera doors ram shut, and your hands run mechanically through the power reduction for descent.

Rojas taps your elbow. You reach out and take the fuel report he hands you. It's not as bad as it might be, but it's not good. Well, maybe a tail wind . . .

You've used up your altitude and you're cruising an hour from base—you hope. The last sun line Scotty got before the angle went too low showed no tail wind. You're close enough now to the coast for a radio D/F fix. Scotty is shaking his head dubiously. He turns from the radio to his chart, draws a line. He takes the howgozit from Rojas, makes a dot.

"A date late and a dollar short, boss. Our reserve is down the drain due to headwind."

If Miramar is VFR, you're fat. There's ample fuel for a normal approach and let-down VFR. But a GCA will mean you'll be risking a wave-off with less than 400 lb. remaining by the gauges. The gauges could be wrong, just wrong enough to . . .

"Splut-chug!"

The plane shudders as if struck a blow. The port engine again, but the instruments are still normal. Ten tense minutes pass and there is no further misfire.

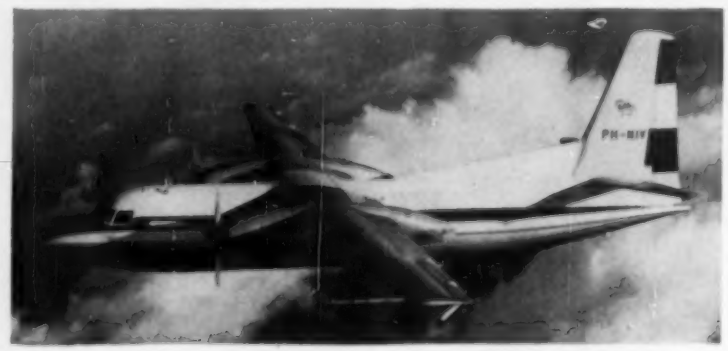
"Photo-tech to pilot."

"Shoot, Hagerty."

"Miramar weather. Ceiling 200 feet, visibility half a mile. Wind calm. Ground fog."

"Roger."

*(Continued on page 62)*



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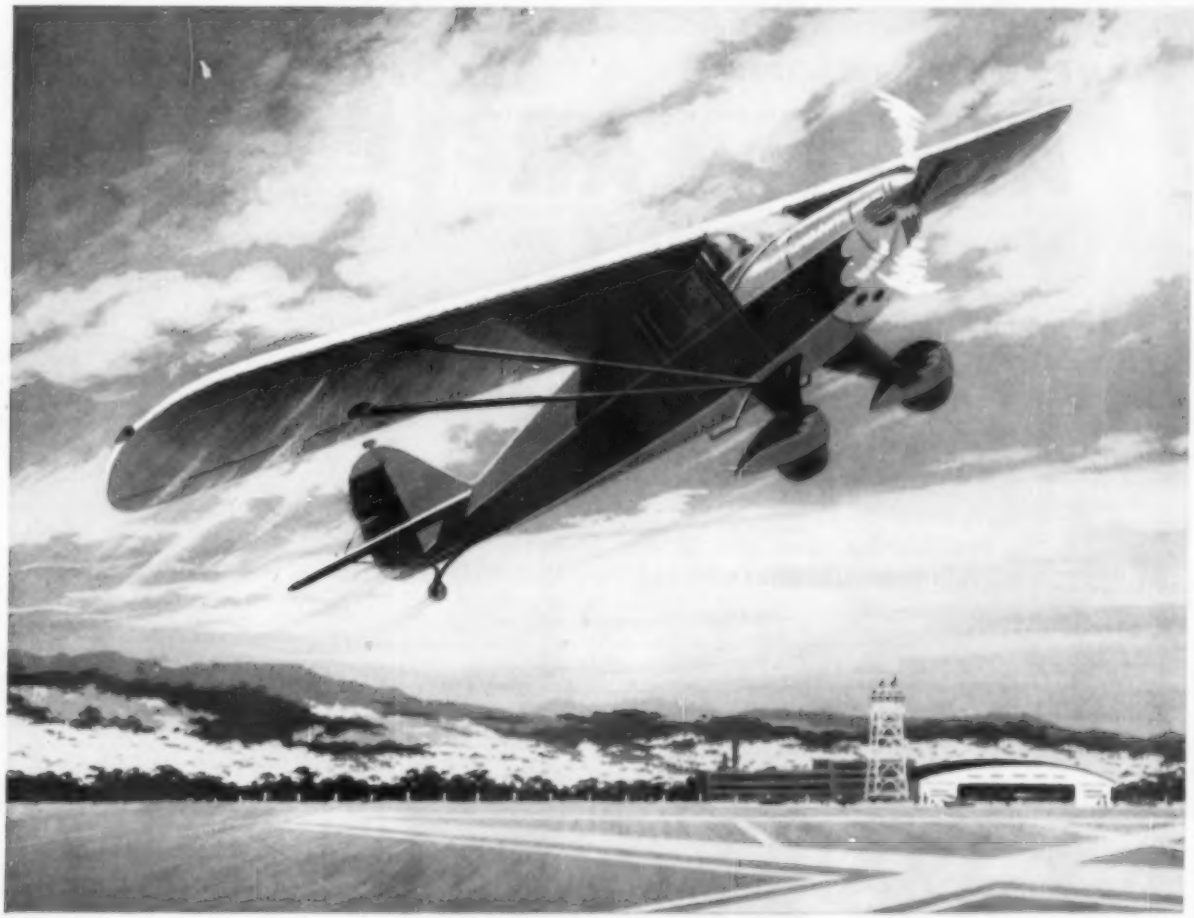
The F-27 has been designed with the local service airline and the business aircraft operator in mind. A high-wing, tricycle gear aircraft, it is fully pressurized, has a cruising speed in excess of 280 mph, effective range of 2,250 miles, sea level rate of climb of 1,500 fpm, and one-engine-out rate of climb of 350 fpm at 5,000 feet when fully loaded. There are no hydraulics in the aircraft, pneumatics being used throughout. The 40-passenger plane is powered by two Rolls Royce Dart turbo-prop engines. It carries a price tag of $540,000.

The first F-27 to be produced by Fairchild will be delivered to Mackey Airlines which operates DC-3's and DC-4's in Florida and the Bahamas. Frontier Airlines, using DC-3's in the Rocky Mountain area, has ordered two F-27's and has options on four others. West Coast Airlines, operating DC-3's in the Northwest has ordered four and has options on four.



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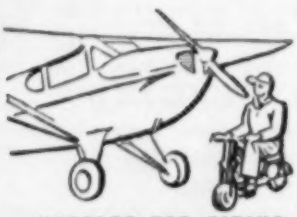

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*(Continued from page 60)*

Scotty has the H. O. 510 let-down charts and the Radio Facilities book. He hands you the San Diego GCA plate from the former, reads from the latter, "Miramar GCA minimums, ceiling 100 feet, visibility one-quarter mile. Man, we got it made—they're above minimums!"

Nobody chuckles. The sun is down now, and below you the thick stratus spreads out endlessly. Over the range station, you check instruments again. Normal. No sense feathering with the power there. Watch it close, though.

"San Diego approach control, Navy 28054 over San Diego at 43 at 2,500. Low state emergency for immediate GCA to NAS Miramar. No wave-off. Over."

"Roger, 28054. Cleared for immediate approach. Contact Miramar GCA channel 8."

The familiar and confident GCA team chit-chat settles your fluttering stomach as you go through the old routine of descent and check-off list, base leg, and approach path lineup. Beside you, Scotty chants the landing list, turns the nav lights from flash to steady entering the soup.

". . . your rate of descent is good, you are on course and on glide path. You are slightly below glide path now, bring it up. You are on glide path and holding. You are passing through GCA minimums. You are on course and on glide path . . ."

Scotty thumps your shoulder. You look up and see the gorgeous, lovely runway lights twinkling murkily.

". . . you are over the touchdown point . . ."

Your tires make that friendly, "Urk, urk!" on the runway and you pull the power all the way off. A delightful surging feeling wells in your stomach and you can't help shooting a grin sideways at Scotty, who is doing the same to you.

"All hands," intones Hagerty solemnly, "are cordially invited to the Photo Lab this evening for a showing of Hagerty's volcanic portraits."

"28054, Miramar Ground Control. You are clear for right when slow."

You brake and start the turn, but something's wrong. She won't swing. You apply both brakes firmly and the big plane comes to a stop.

"Look," says Rojas, "No engine."

The port propeller is no longer turning.

It's 0815 next day. LCDR Chuck Demoss, Squadron Maintenance Officer, meets you in the ready room after quarters for muster. Lt. Bud Avery, the Power Plants Officer, hands Chuck the night check data on 28054's port engine.

"Swallowed a valve," says Chuck, cheerfully. "Must have happened during rollout. These previous burps were at the start of the trouble, when the valve began to stick."

Scotty, dropping into a chair, murmurs thoughtfully, "The detail officer said Photo flying was fruit. Pictures, he said, are taken only in good weather. All VFR, he said, and no sweat."

You don't say anything. You've seen the volcano pictures. They looked good.

END

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## Trouble at Mach 1

*(Continued from page 39)*

The original shot-in-the-arm for the airframe was first discovered in a high speed wind tunnel in Nazi Germany about 1940, when the effect of swept wings in delaying shock wave formation was realized. This simple change was the primary factor in boosting the speed of the straight winged North American FJ-1 *Fury* from 555 mph to 650 in the swept FJ-2. Wing fences are another refinement now widely used. They block undesirable air flows from moving progressively along the wing, thus disrupting conditions over the entire span. Typical of many changes, the rounded engine air-inlet of the F-86 has yielded to the square-cut razor-sharp opening of the F-100, designed for the best possible ram pressure recovery at sonic speeds. The Grumman F9F manages to combine nearly all the above features in its latest production model, the F9F-8 *Cougar*, as can be seen in the accompanying photograph.

However, as many modified airplanes crept a little closer to the barrier ahead, another even more relentless enemy, buffeting, threatened them. A variety of conditions can cause these severe high-speed oscillations; and the cure for one ship will rarely be a "fix" for another design.

The guilty party is the high speed gremlin, flow separation. During low speed flight, air behaves itself and flows smoothly over a plane's surfaces. At high speeds, the boundary layer may break away at some critical area such as the trailing edge of the wing, or the wing-fuselage separation moves forward, causing vortexes to form in the void between airstream and airframe. Drag multiplies rapidly and control surfaces downstream are flung first one way and then the other, just as a flag is whipped back and forth in a strong wind. If buffeting is not controlled, structural failure may ensue.

One solution coming into use more and more, has been "vortex generators" on the plane's surfaces just ahead of the trouble spot. These consist of a row of very small knife-like projections cocked slightly with respect to the normal airstream. It is no secret that boundary layer separation can be prevented, or at least delayed, by forcing the flow from "laminar" to "turbulent," so these small vortex generators may be a simple way of accomplishing this. While skin drag is increased slightly, the total drag is cut considerably.

Experimental installations have been seen on many aircraft to date including the B-47, the 707, and Hawker *Sea Hawk*.

Transonic flight also has caused some difficulty with getting enough air to the engine. This becomes more difficult as speed is increased. To obtain the highest possible thrust-to-weight ratio, supersonic jet engines are designed to operate most efficiently under a rather limited range of airflows. At subsonic speeds the problem is not critical, but at Mach 1 and higher it is very difficult to get the correct amount of air aboard without flow instability, and loss of ram pressure recovery in the inlet.

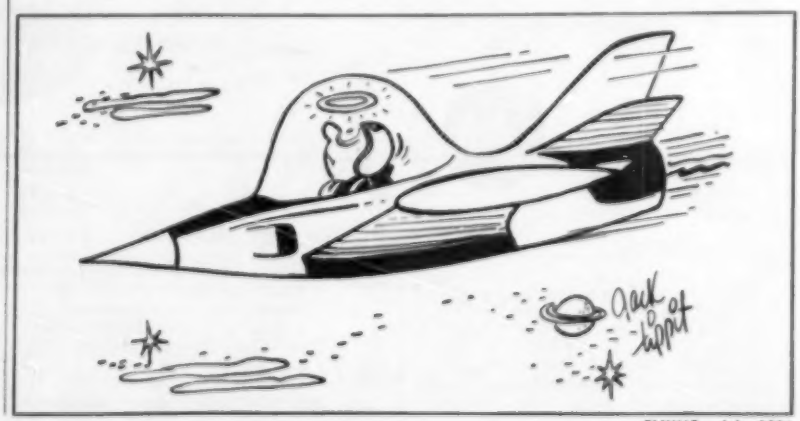
After cancellation of the J40 for the delta-winged F4D-1 and substitution of the larger J57, so much trouble was encountered with the old air inlet that an extensive test program was undertaken at Edwards Air Force Base to find a "fix." The new Mach 2, Lockheed F-104, has a very sharp wing leading edge, a very thin wing and *variable-opening* air inlets for the J65 engine. These probably have adjustable "lower lips" on the inlet and should give high efficiencies over the entire speed range. To date the "104" is the only known plane so fitted and emphasizes the importance of close design coordination between the airframe and engine manufacturers.

Almost without exception, each of these many ingenious ideas pushed the top speeds of our combat planes higher, but none resulted in spectacular changes in performance except the original sweeping of the wings.

However, in late 1955 the NACA declassified information on a design procedure that has given another radical boost to aircraft performance—the "area rule," credited to Richard T. Whitcomb. This design principle has been used on three of our newest fighters, the delta Convair YF-102A, the Grumman XF11F-1 *Tiger*, and the Vought XF8U-1.

Basically, application of the area rule to a high speed airplane can cut to a fraction the staggering drag increases normally encountered from about Mach 0.85 to Mach 1.1. Within this speed range

*(Continued on page 66)*



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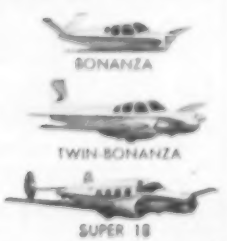

(Continued from page 64)

the coefficient of drag for an aircraft can more than double, due to the tremendous amount of energy consumed by shock waves forming over the entire plane. It is this huge increase in drag coefficient, (and total drag), that accounts for the sonic barrier and requires doubling and tripling power output to push past the speed of sound.

When an airplane is flying, the air in its immediate vicinity moves out around the ship as it passes by, and to do this is forced to accelerate to a speed above the actual velocity of the plane. First the speed of the air increases as it moves around the fuselage. When the wing is reached, the air speeds up even more; and if another protuberance, such as an engine housing is encountered, the velocity increase is terrific. It is therefore possible to have power-consuming shock wave formations at plane speeds well below that of sound.

Basically, the "area rule" adjusts the total cross-section of the plane at each point along its length to give a gradual area change in spite of projecting wings, etc. This eliminates interference of wing and other parts with fuselage.

The best way to see how this works is through an example. The original delta winged Convair YF-102 of 1952 was intended for supersonic flight, but could not reach the objective. Something was radically wrong and, unless a solution could be found, the prospects for production were slim. Tests in the NACA's eight-foot wind tunnel showed the drag increase was too high; application of the area rule was the answer.

Figure 2 shows the original configuration of the plane and the alterations made in the YF-102A. First, the nose was lengthened and the cockpit revised to "sharpen" the front of the plane and prevent rapid acceleration of the primary airstream, caused by too fast a buildup in area. To prevent a sharp decrease aft of the cockpit, a fairing was extended back to the tail. When the wing was reached, the fuselage was gradually cut back in diameter; so the total cross sectional area of the fighter remained about the same and further air speed-up was negligible. The process was reversed as the wing trailing edge was approached. The final step was the addition of a blister to each side of the rear fuselage to give a gradual decrease as the airstream passed the squared-off tail pipe.

These revisions seem minor, but their effect was fantastic. The YF-102A shot past Mach 1 on its second flight. Both the Grumman *Tiger* and the Vought XF8U-1 were caught in early design stages and modified accordingly, giving them the characteristic "coke-bottle" fuselage with its indented center section.

So, we see that reaching sonic flight is far from simple. Even with the application of many of the above revisions to basic airframes, continual development of advanced ideas will be required as more planes enter the supersonic range. Most new designs will have problems requiring "fixes" of some sort until research has thoroughly explored the transonic speed range—a goal still far in the future. END


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I also insist that, if you're going to ride in it, Mergy's plane be serviced by Southwest Airmotive. Tell him that all old business pilots have found it's really less expensive and a lot more sensible to go First Class. After 24 years, SAC has the know-how and equipment to do flying's finest job on engines, accessories, aircraft, props, instruments, refueling, and new-parts distribution.

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Love,

Daddy

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AIRCRAFT OWNERS AND PILOTS ASSOCIATION

# AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is "To make flying more useful, less expensive, safer and more fun."

Headquarters address is Box 5960, Washington 14, D.C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING Magazine.

## EXPERIMENT PAYS OFF

Private pilots today are able to obtain life insurance in at least 36 life insurance companies at standard rates because an experiment, started five years ago by AOPA with the assistance of the Minnesota Mutual Life Insurance Company of St. Paul, Minn., paid off.

Purpose of the experiment was to determine whether private pilots were such bad insurance risks that they should be denied life insurance coverage, or be able to get it only by paying premiums ranging from $3 to $5 per $1,000 coverage above standard rates.

AOPA decided that the best way to prove that private pilots were not being treated fairly by the underwriters was to start writing insurance on the lives of private pilots. Thus, with the assistance of Minnesota Mutual, the AOPA Insurance Plan was born. It provided AOPA members with regular life insurance at low rates.

The AOPA-Minnesota Mutual arrangement proved to be more than just a successful insurance writing venture. It caused a minor revolution in the life insurance business. Results of the plan thoroughly debunked contentions of major companies that private flyers should pay a penalty when they obtained life insurance. The $28,000,000 insurance in effect on the lives of AOPA members on the fifth anniversary of the plan last May 1 attested to its workability.

The *National Underwriter*, insurance industry trade publication, recently reported that 87% of a group of representative companies surveyed by the Institute of Life Insurance now will issue insurance at standard rates to private pilots if the applicants meet certain qualifications of age, flying experience and expected flying time. When the institute made its last previous survey, in 1948, it found no companies which were issuing policies to private pilots at standard rates.

"While one per cent of the companies surveyed now exclude the air risk from policies issued to private pilots, two-fifths of them excluded the risk or declined the applicants in 1935," the National Underwriter article said.

While the institute attributed the liberalization in underwriting practices to the improved mortality among owner-operators of airplanes, AOPA found—in 1951—that there had been little change in the attitude of underwriters toward acceptance of private pilots as standard insurance risks. The AOPA Insurance Plan was started for that reason. The institute's survey bears out AOPA's findings in regard to the change in underwriting practices occurring since the AOPA Insurance Plan was started.

Reports on 36 companies, obtained by AOPA from its members and other sources, indicate that each company varies a bit in its requirements of applicants. All limit the number of expected hours of flying. This ranges from 100 to 125 hours annually, with a majority specifying 110 hours. All but two of the 36 companies require that a private pilot have 400 hours of flying time when the policy is written. One of the exceptions requires only 200 hours, while the other specifies 500 hours.

The AOPA Insurance Plan requirements are simple. Any active pilot who is a member of AOPA, holds a CAA medical certificate, and applies for insurance and is accepted by Minnesota Mutual before his sixty-first birthday, is eligible for the insurance.

In addition to being eligible for term insurance under the AOPA-Minnesota Mutual program, AOPA members automatically receive accident insurance written by the American Mercury Insurance Company when they join the Association. This policy pays $700 for accidental death resulting while flying in an airplane during the first year of membership, and increases $100 each year until $1,000 coverage is attained. The membership policy also carries medical and dismemberment provisions.

## SUBSCRIPTIONS NET FUND $2,736

Since its inauguration about 15 months ago, AOPA's plan to provide magazine subscription service to its members has served 1,836 AOPA'ers and has sent $2,736 into the coffers of the AOPA Foundation, Inc., for aviation safety research.

A recent tabulation of the plan's results showed that the 10 magazines leading in popularity among AOPA members were in this order: *Life*, *Reader's Digest*, *Time*, *Saturday Evening Post*, *Better Homes and Gardens*, *House Beautiful*, *Newsweek*, *Popular Science Monthly*, *Aviation Week*, and *True*.

The plan works this way: When the AOPA member's subscriptions need renewing, or when he is solicited by a publishing house, he places his subscription through AOPA Headquarters at regular subscription rates, or the discount rates offered by publishers. Profits go directly into the treasury of the AOPA Foundation, a non-profit organization dedicated to scientific aviation research that can make flying safer.

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Rates at the Greenbrier are all based on American plan and start at $24 per day for a single room or $40 for a double. In addition to the Greenbrier, there are three other hotels and three motels in the town of White Sulphur Springs.

## Pressure Patterns and Weather

*(Continued from page 45)*

ing 400 feet, that there was a tendency to ice up. To offset this, I left the carburetor heat partially on until I cleared the area of precipitation.

Once out from under the cloud cover, it was as though we had climbed from a dark well. The sunshine was brilliant, and punctuated with some small white fracto-cumulus. With a hum of contentment, the Lycoming perked up 50 rpm when I pushed off the carb heat. Under way in clear weather, I took up a heading of 300 degrees and found my drift was a strong left. This was auspicious as it confirmed my original presumption that I would be proceeding into a high pressure cell where the winds flow in a clockwise direction.

To make a good ground speed as possible, I kept the *Tri-Pacer* at 1,100 feet above terrain until I could see the runways of Baer Field at Fort Wayne. Then I put the Piper into a climbing turn to the left, called Fort Wayne radio and checked weather along my intepded route and at the terminal. It was CAVU all the way. Fort Wayne gave me winds aloft and the report indicated best winds for my course were at 10,000 feet. So up we went.

After reaching cruising altitude on a

*(Continued on page 72)*

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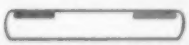
**3** 

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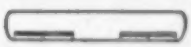
**4** 

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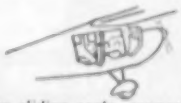
**6** 

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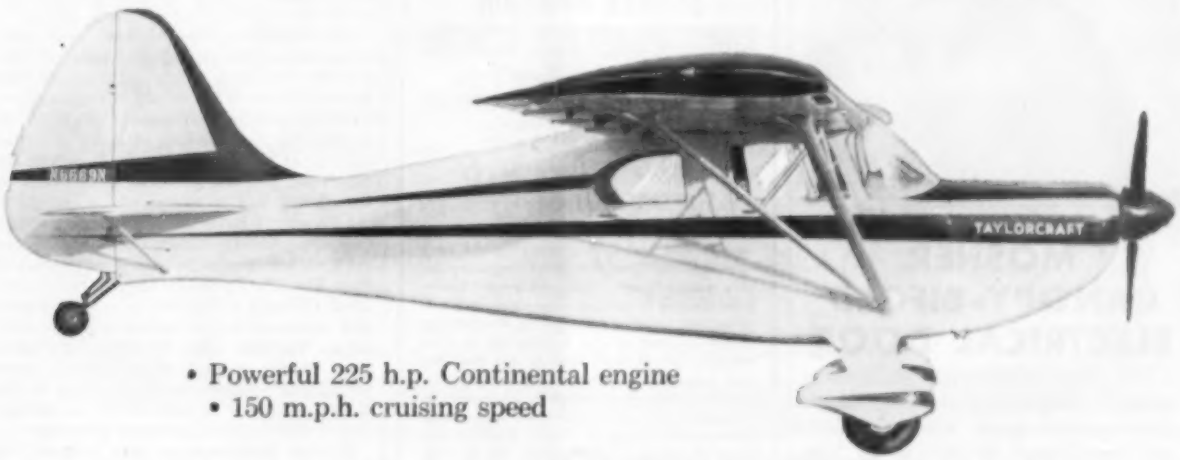


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*(Continued from page 70)*

heading of 255 degrees, it was just a matter of adjusting mixture before sitting back and relaxing. The air was cool, stable and clear. By adding a touch of trim, the *Tri-Pacer* literally flew itself, with only a touch of rudder occasionally to make a minor heading correction.

Here then, came the pleasure of pressure pattern flight planning. My first prominent check point of Chanute AFB came up in 00:58. The distance from Fort Wayne to Chanute measured 165 miles and this meant a ground speed of 170 mph for the 135 hp *Tri-Pacer*. By computing the true airspeed at 10,000 feet, and subtracting it from the ground speed, I found I was enjoying a tailwind of 40 mph. Such a wind condition continued to prevail as I flew along the course. One hour and 23 minutes out of Chanute, I passed south of Kirksville. On this basis I computed my arrival over Kansas City, some 110 miles yet, in another 40 minutes.

Once on the ground, I summed up the statistics of the pressure pattern trip to compare with the rhumb line course figures.

If it had been possible to fly the rhumb line course under the conditions depicted in Fig. 2, it would have taken me about 05:20. This figure is based on a distance of 620 miles at a ground speed of 118 mph, due to pre-frontal turbulence plus headwinds.

By applying pressure pattern planning, I traveled 660 miles, but the actual flight time was less. It took 04:12 to fly the Columbus-Fort Wayne-Kansas City course. This compared with the rhumb line course time of 05:20, indicated a savings of 01:08 in actual flying time.

In considering the elapsed time—and we must include the 01:45 I spent on the ground at Lima while sitting out the storm—it meant I was but 45 minutes behind my original schedule. Compare this to possible cancellation of the flight that day, or at best an arrival in Kansas City much too late for business, had I held to the rhumb line planning.

Likewise, I have found that the pattern concept of flight planning offers advantages when a low pressure cell is encountered (see Fig. 3). Recently we planned a trip from Chicago to Topeka in a twin Beech and observed that an active low confronted us. Reports long the intended rhumb line course warned of a tornado area which phenomena usually develop in the warm section of a cold-warm, or stationary, front combination lying in a low.

Rather than attempt such a flight, we decided to fly a curved route through the northern half of the low. From Chicago we swung in an arc toward Des Moines and then down to Topeka. While we did encounter instrument conditions on portions of the pressure pattern course, the winds were behind us and we avoided the severest weather that existed between Chicago and Topeka.

So the technique of pressure pattern planning offers the pilot a choice of courses to a destination. By studying a weather map with an eye to the location of low and high pressure cells, the pilot can plan his flight for a maximum of safety, economy and a smooth ride. END

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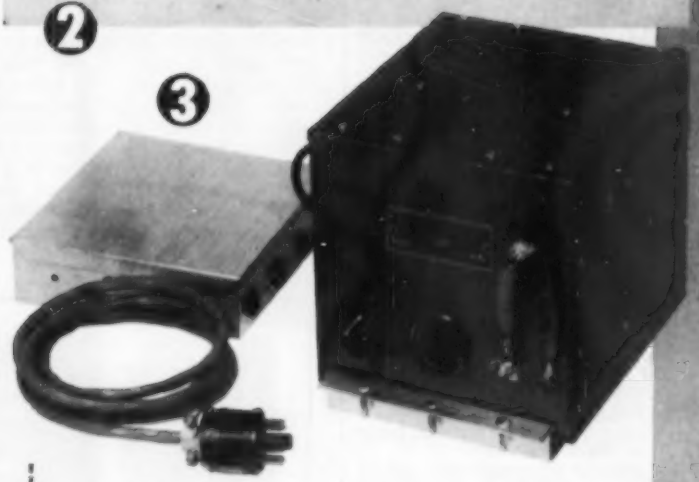

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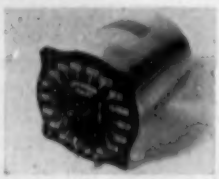

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## A Ship to Be Loved

*(Continued from page 26)*

1942, Captain Hart commanding, she carried 56 delegates home from the Rio de Janeiro conference and later that year, was in the news again. Out in Bolama, in Portuguese Guinea, being taxied to moorings, she was swept by a strong gust which rammed her broadside against an uncharted reef. With a tropical storm approaching, Captain Winston had no choice but to gun the engines. He eased the 84,000-pound ship off the reef and taxied to a sheltered area.

The hull had been ripped from port to starboard. Flight engineers Tunis and McCrea improvised a diving helmet from a 5-gallon flour can and put in a disc of glass for a window. Water was pumped from each of the damaged compartments and plates screwed on the hull. They drilled about a thousand holes, 300 of them underwater and, temporarily repaired, she returned to New York.

When President Roosevelt went to Casablanca, he was flown there in a B-314. Royalty and statesmen were the rule rather than the exception on the passenger lists. During winter the return flights from Lisbon to New York were routed via Bolama in West Africa and Para in Brazil, thence to Trinidad, San Juan and New York, to take advantage of seasonal westerly winds. This route was extraordinary in many respects. In Para, for instance, Pan American had rented a good-sized river steamer and anchored it in the river. Its sole purpose was to provide breakfast for passengers, while refueling. Leaving San Juan, Puerto Rico, the Clipper would take off at night. A launch was sent out in advance to shoot up flares. Then the ship roared off on the last leg toward New York.

Passengers who were regular commuters across the Atlantic, after a while, felt as if they had lived on the Clippers for years. In the rhythm of the engines and at harmony with the slight swaying of the ship, there was something about these craft that no one could understand, who has not experienced it.

What, then, became of them? When the DC-4's and *Constellations* took over after the war, the Boeings became obsolete. On April 16, 1946, the last 314 returned from Honolulu to San Francisco. Since they had been purchased by Navy when the war broke out, although operated by Pan

*(Continued on page 76)*

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Radio Cincinnati owns and operates four radio and television stations in Columbus, and WKRC AM and TV in Cincinnati; and it also owns 30 per cent of WBIR AM and TV in Knoxville, Tenn. Hulbert Taft, Jr., 48 year old president of Radio Cincinnati, is a former Air Force radar specialist, fighter controller. Learning to fly in 1942, he now carries a private license with single and multi-engine ratings. With Dale Ward, company pilot and also an Air Force veteran, the two do most of the company's flying. However, aviation is a key word to the entire Radio Cincinnati organization. In addition to the flying president, WTVN TV in Columbus has its share of pilots. They include: William Hansher, engineering assistant to Mr. Taft and an Air Force veteran; William Hight, account executive; Herbert Heibrun, sales manager; Gene Fullen, emcee and disc jockey. Prior to purchase of the Cessna 310, the company had owned and operated a single engine plane for four years.

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*(Continued from page 74)*

American, they were to be sold as Navy surplus. There weren't many takers. Some of them were left corroding on Lindbergh Field in San Diego. One was sold as a houseboat to a family in Miami. Several ended up as cargo transports on the Amazon, their fate hardly worthy of their glorious past.

Only one ship died in a more dramatic manner, the NC-18612, "Bermuda Sky Queen," which had been purchased in 1946 by American International Airways, a non-scheduled carrier. She had left Poole, England, on October 12, 1947, with 62 passengers and 3,651 pounds of baggage. Since weather was unfavorable across the North Atlantic, the flight remained at Foynes, Ireland, overnight. The next day take-off from Foynes was accomplished at 3:40 p.m. The flight climbed to a cruising altitude of 8,000 feet, proceeded on course for five hours and 50 minutes over the top of the clouds. Then, at 9:30 p.m. instrument weather was encountered. Celestial navigation was no longer possible.

Estimated time of arrival over the U.S. Coast Guard ship *Bibb* was 2:00 a.m. This turned out to be 45 minutes later than was originally estimated. The average headwind had been given by the weather bureau at Foynes as 26 knots. Based on a true airspeed of 130 knots the time en route was estimated to be 17 hours. Shortly after midnight, icing conditions were encountered and the flight descended to 6,000 feet. At this time the flight received a weather forecast from Gander which quoted a headwind 12 knots greater than at first estimated. The flight proceeded without the benefit of celestial fix until 0205 a.m. when a radar fix from the *Bibb* placed the aircraft 68 miles from the vessel.

At this time the ship had flown 900 miles from Foynes, was almost halfway to Gander and had used 10 hours and 25 minutes of the 22 hours of fuel on board. At 5:00 a.m. clear weather was encountered and celestial fixes were taken. It suddenly became apparent that headwinds in excess of 60 knots had existed en route. The crew immediately became concerned as to whether or not the fuel remaining was sufficient. Approximately 550 miles remained to Gander. The flight, however, continued westward. Then at 0800 a.m., it was realized the situation was hopeless. The aircraft turned back toward the *Bibb*. Gander was advised of the decision. At 9:40 a.m. the aircraft ditched in waves eight feet high. Taxiing toward the *Bibb*, the aircraft and the *Bibb* drifted together, and the Bermuda Sky Queen was severely damaged. Rescue operations were slow and hazardous because of the high seas but, by the next day, all passengers and crew had been transferred to the *Bibb*.

Since the aircraft could not be flown from its position because of damage and high seas, it was considered a hazard to surface navigation, and therefore sunk by gunfire.

As its triple tail disappeared in the icy Atlantic waves, the most glamorous era of civil aviation closed. The 314 was a ship to be loved. END

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## I Learned About Flying from That!

*(Continued from page 52)*

were zigzagging through scattered showers and clouds which closed in to form a 1,500 foot overcast. It was a little tough to keep the one and only road within gliding distance. Also, that road was our sole good check point to prevent missing the landing strip at La Ronge.

About 40 miles from La Ronge the engine got rough, but carburetor heat brought it back. I explained to Fred that I had iced up a number of times with this airplane, and it had always cleared nicely with heat. We went on in with carburetor heat full on and circled the little village twice to let Lindy know we had arrived.

Lindy hauled us to his camp where we were comfortably quartered in a good log cabin. Fred and Bill had been correct in claiming that the fishing would be terrific. With Tom, our Cree Indian guide, and Lindy's boats and motors, we went on a fishing spree. The Lake Trout did a pretty good job of eluding us, but we had Walleye running out of our ears and the number of ten-pound Northern Pike we threw back was downright ridiculous.

A week passed all too quickly. Saturday was warm and cloudless. Our fish were filleted and frozen for us, and weighed so much that, to stay within weight limits, we left our gear to be taken home later in the trailer of some other Lincoln people.

Out at the airstrip we checked the plane and topped the tanks from the fuel cache of the Saskatchewan Government Airways. Bill and the fish were tucked into the back seat. Fred and I crawled into the front seats, started the engine, and taxied to the south end of the runway. There was a noticeable roughness on the right mag. We had plenty of time and there was no reason to take any chances, so we taxied back to get the trouble corrected. The Government Airways mechanic found nothing wrong with the magnetos, so pulled a spark plug. It was fouled badly so he decided to take out all the plugs. They all proved dirty, and we got them cleaned by the filling station operator in town. After running several minutes as smoothly as you could wish, we decided the engine trouble had been corrected.

Everybody got back in the airplane ready to try it again. At the downwind end of the runway, we set the brakes and gave each mag a good check at partial and full throttle. I pulled carburetor heat and got a satisfactory drop in rpm. Everything was okay. Dropping a notch of flap, we swung into the wind, gave her full throttle, and moved down the strip. Just beyond, the ground got a little higher and was covered with forest and muskeg. The airplane got off nicely and proceeded to climb normally.

Bang, pop, pop, bang! Our engine was shaking terrifically and our power was gone. We weren't a hundred feet above the trees. Maybe the fuel line was clogged. Switch to the other tank. No help there. Keep the nose down. Head for the trees or the swamp? Wiggle the magneto switch. No help. We're going in. Drop full flaps and slow her up. We're on top of the trees now, hold it off—off, we want to mush in. Cut the switch. The nose is high, our speed is dropping, fine . . . there's the stall, we're in the trees. Instinctively I throw my arms in front of my face and brace for the crash. We have stopped. Where was the crash? I've bounced more than this in normal landings on concrete. Is everybody okay? Let's get out of here. Might catch fire. Bill, why are you so slow? Fred is out, now me. Holy smoke, no wonder Bill was so slow getting out, we were ten feet off the ground.

We all sat down for a minute to catch our breath and take stock of the situation. We had mushed into a thick grove of Birch trees. The plane was hanging up in the air on these Birches.

We had only a couple of hours of sunshine left at the most. Maybe we should try to get to town because we sure didn't want to spend the night in the cold bush. I shinnied up a tree and tossed down our jackets, flashlight, sandwiches, and mosquito repellent. Fred wrote a note and stuck it in a prominent spot to notify any rescuers that we had headed south. We smeared on plenty of repellent and headed into the bush, keeping the late afternoon sun to our right.

Breaking branches and small trees to mark the trail as we slogged along, we went alternately through thick timber and muskeg swamp. Within 30 minutes, we picked up the sound of outboard motors ahead and before long an old, overgrown wagon road headed south to within a half mile of Lindy's camp.

*(Continued on page 80)*

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*(Continued from page 78)*

It was mighty pleasant to relax in Lindy's cabin, but our troubles were not over. We had to be home Sunday. We had a damaged airplane down in the bush 1,500 miles from home. With Lindy's help we began to get a few of the answers. He found a friend with the government fire fighting service who thought he could locate the airplane, and would get together a gang of Indians to cut a road and pack it out. The mechanic would go in with us and supervise disassembly.

Saturday morning the Indians located the plane and had a good start on hacking out a road by the time we arrived with the mechanic. We retrieved our frozen fish from the airplane and started them to the freezer at camp on the packboards of a couple of Indians. We couldn't let those fish spoil now!

Getting the airplane down to the ground was accomplished without much additional damage. By noon the disassembly job was completed and the Indian packers started out with the wings—six Indians per wing. The fuselage presented a tougher problem. With Indians pushing, pulling and clearing stumps and rocks, we slowly moved along our newly hewn road until the edge of the muskeg was reached. But our fire-fighting woodsman wasn't stopped here either. He got the Indians busy felling trees and soon had a sled built and the fuselage hoisted aboard. A small tractor, which the Government Airways used to clear snow pulled our "sled" across the muskeg and through the remaining forest. Our plane was put in the Government hangar, the Indians paid, and our report made to the local headquarters of the Royal Canadian Mounted Police. There appeared to be no major structural damage. The airplane definitely was worth salvaging. All we could do now was get some sleep and wait for the chartered plane, for which we had radioed.

What had caused our engine failure? The mechanic said it was carburetor ice. He said ice was a constant threat in the bush country and that all their planes were equipped with carburetor temperature indicators, and often operated with partial heat applied. I still just couldn't believe that carb ice had been our trouble. This airplane just didn't ice up that fast and without warning. Besides, the weather had been clear, warm and dry. It just must have been water or dirt in the fuel line, or a broken valve, or something like that.

An Army surplus trailer, designed to carry a glider, was found and carried our plane home behind my car. One of those dangerous, tiring, automobile trips had to be made after all. Safe again in the home hangar we checked the engine. It started right off and ran fine! After the airplane had been repaired, it was flown a couple of hours before anything further was done to the engine!

So I learned that carburetor ice is a constant danger, even in warm sunny weather and with *any* airplane. From now on, when checking an engine prior to take off, I apply carb heat a long time—long enough to melt any ice that may have built up on the ground. END

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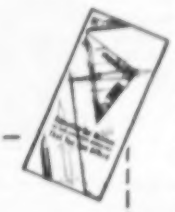

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## Check pilot report on the Flut-r-bug

*(Continued from page 43)*

are of novel yet highly effective design. Instead of being built into the wing as on conventional aircraft, they consist of a 4-inch extension at the wing's trailing edge. This provides excellent opportunity for installation of flaps merely by continuing this extension to the fuselage and rigging the section so that it drops downward.

The brakes, with linings similar to those of the old Model A Ford, are mechanical and actuated by a lever below the instrument panel. The same lever, by locking into place, can serve as a parking brake. Braking tests at speeds up to 70 mph with the wings removed showed no tendency for the plane to swerve.

I mentioned to Mr. Stits that this looked like a return to the Heath *Parasol* type of aircraft.

"Well," smiled the designer, "I don't contend to be a genius but if the little plane will benefit those who have the desire to fly but must consider carefully the cost, I'll feel rewarded." END

## TWO-PLACE FLUT-R-BUG FOR GERMANY

AFTER MAKING a six-month survey of the lightplane market last year, designer Ray Stits came to the conclusion that there is a very large demand for a two-place airplane having a low initial cost, low maintenance cost, safety, simplicity in design, and high performance. He now has in full production just such a two-place plane. Price for the completely pre-fabricated kit is $1,295 exclusive of engine, prop and instruments. A really ambitious amateur builder can buy the plans for $35 and make his own plane from scratch.

As we went to press, Stits was completing details of a contract agreement for a Flut-R-Bug dealership in Bonn, Germany, with Woldermar Kost, a leading European sports plane importer. According to an article in the Riverside (Calif.) Daily Press, the former German air force officer had been searching for a light aircraft that could be sold in Germany for a price comparable to the average automobile. According to Kost, the Germans are taking to the air in droves since the ban on private flying was lifted more than a year ago.

Plans call for 100 unassembled kits to be shipped to Bonn by air freight where they will be assembled by German labor. Stits plans to modify the present two-place tandem model for the German market to provide a side-by-side arrangement which is more popular over there. The initial order of 100 kits will be turned out at the Stits plant at Riverside at the rate of 10 a month.

**2-PLACE FLUT-R-BUG**

**Model SA-6A**

| | |
|---|---|
| Wing span | 26 feet |
| Length | 17' 6" |
| Height | 6 feet |
| Net weight | 500 lbs. |
| Engine | Continental A-65-8 (Engines up to C-90 optional) |
| Fuel | 12½ gal. |
| Wing area | 130 sq. ft. |
| Useful load | 400 lbs. |
| Gross weight | 1,025 lbs. |
| Wing loading (gross wgt.) | 7.8 lbs./sq. ft. |
| Take-off distance | Solo: 100 feet<br>Gross weight: 300 feet |
| Rate of climb | Over 1,000 fpm |
| Cruise | 100 mph |
| Stall (power off) | Solo: 33 mph<br>Gross weight: 38 mph |
| Service ceiling | Over 12,000 feet |

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**Model A-11**

8 day clock, USAF spec. MIL-C-7939A, AN 5743-2 and AN 5743L2. Available with long or short knob, it winds and sets from the front of its lightweight, oxidized aluminum case. 1⅞" dial.

**Model A-11 ET**

8 day clock . . . same as Model A-11 but has additional two hands, controlled by center knob. These two hands function as elapsed time hands. Simplifies keeping track of your E. T. A. . . . just set the dummy hands on your estimated time of arrival, and the clock does the rest. 1⅞" dial.

**Model A-11-24**

8 day clock, same as model A-11 but with 24 hour dial. Available with long or short knob, it winds and sets from the front of its lightweight, oxidized aluminum case. 1⅞" dial.

**Model 640**

8 day elapsed time aircraft clock . . . precision movement records time of trip, with independent stopping device. Type A-10A, spec. MIL-C-9196 (USAF). Fits standard panel opening; 2¼" dial. 12 hour register and independent 60 minute register. Lightweight, unbreakable oxidized aluminum case.

**Model 618-12**

8 day elapsed time aircraft clock . . . precision movement records time of trip, with independent stopping device. Modified type A-10A. Fits standard panel opening; 2¼" dial. 12 hour dial with center chronographic sweep second and hour register hands. Lightweight, unbreakable oxidized aluminum case.

**Model 618-24**

8 day elapsed time aircraft clock . . . precision movement records time of trip, with independent stopping device. Modified type A-10A. Fits standard panel opening; 2¼" dial. 24 hour dial with center chronographic sweep second and hour register hands. Lightweight, unbreakable oxidized aluminum case.

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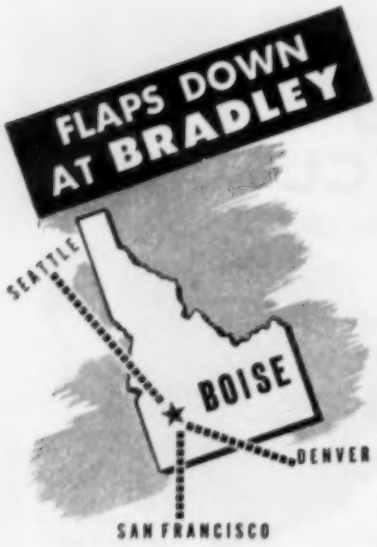


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## Flight Handbook

*(Continued from page 46)*

sections on weather recognition, emergency procedures, weight and balance, navigation, or visual flight rules, but keep your information in quick-fact form. Don't overburden your handbook with useless information. The illustrations accompanying this article are ideal for beginning your handbook; they contain pertinent information you're bound to need sometime—the kind that's easy to forget, but absolutely essential when the situation calls for the right answer in a hurry.

Let's review each one briefly—then get the scissors and start clipping.

● *Light-gun signals:* You may have the finest radio made, but it isn't infallible. Neither is the power that operates the tower. That's why light-gun signals still have a place in aviation, and why you should have a list handy.

The signal light is an intense, narrow beam aimed at you by the tower much as a gun is aimed. If you see the light, you can be sure it is being aimed at you. The normal signal range in good weather is ten miles in daylight, 15 miles in darkness.

● *Cruising altitudes within control areas and zones:* During VFR conditions aircraft at altitudes of 3,000 feet or more above the surface, including controlled airways, must be flown at odd or even thousand foot levels according to the direction of flight. "Odd" and "Even" indicators are shown on Coast and Geodetic Survey Radio Facility Charts.

Generally the following rules apply: (all altitudes are above sea level)

Green and Red Airways and even-numbered VOR Airways: Eastbound—fly at *odd* thousand-foot altitude. Westbound—fly at *even* thousand-foot altitude.

Amber and Blue Airways and odd-numbered VOR Airways: Northbound—fly at *odd* thousand-foot altitude. Southbound—fly at *even* thousand-foot altitude. Where color airways and VOR Airways overlap, the *odd* or *even* rule for the color airway applies. Where an even-numbered and an odd-numbered VOR Airway coincide, the *odd* or *even* rule for the even-numbered VOR Airway applies.

● *Cruising altitudes outside control areas and zones:* Visual flight rules allow a minimum visibility of one mile *outside* of control zones or areas. If, however, you are at, or above, 3,000 feet above the surface, Civil Air Regulations require you to observe certain altitudes and courses *when the visibility becomes less than three miles.* These courses and altitudes are shown on the Cruising Altitude Chart.

● *Visual flight rules:* You should be able to quote the CAA Visual Flight Rules from memory; if you're a fair-weather week-end pilot, chances are you can't. Flying unintentionally—or unwisely—from VFR into IFR weather is responsible for an alarming percentage of lightplane fatalities. Abiding by visual flight rules keeps you away from this hazard. They're easy to forget, so put them in your handbook.

● *Ground to air distress and visual emer-*

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**WARNER E-1 COMPUTER**

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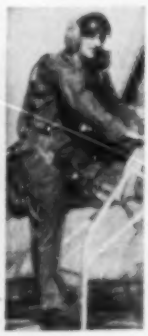

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*gency signals:* You may never need this information, *but*, one day you might be someone's last hope of rescue. Don't let him down! When you see an odd marking on the ground, or someone waving, check your distress signal list. Remember, too, that if you're the fellow on the ground, this list tells you how to set out the signals that might save *your* life. Keep it in your handbook.

● *Index to sectional charts:* Planning a cross-country flight? Flip open your handbook and see instantly what charts you'll need. The Sectional Chart Series provides complete coverage of the United States, but they don't follow state lines. That's where this reference chart comes in handy. Designed primarily for pilotage (or contact) navigation, these charts are generally reprinted every six months. The date of the chart appears in the lower right-hand corner. If your chart has a date older than six months, check to see if a revised chart has been printed. Don't fly with an obsolete chart!

● *Morse code and phonetic alphabet:* If you're still saying "Able, Baker, Charlie, Dog," you're behind the times. This listing has the Morse code, plus the up-to-date phonetic alphabet necessary in your plane-to-ground transmissions.

● *Flight plan information:* If you're an infrequent cross-country flyer, you might forget how to file a flight plan. With this list in your handbook, you need never start off without one. Remember, filing a flight plan is the *only* way you get *automatic, immediate action* from the Search and Rescue Service in the event you are forced down. If you fail to report within one hour after your ETA, a search will be started to locate you. If you fail to report within three hours after your ETA, Search and Rescue Service planes will be in the air looking for you. *Without a flight plan, no one knows you're lost:* File your flight plan with the nearest CAA communications station in person, by telephone or radio. Remember that:

1. If you land somewhere other than intended destination, report the landing to the nearest CAA communications station.
2. If you land en route and are delayed more than an hour, report this information as above.
3. Don't fail to close your flight plan on arrival at destination.

● *Closed airport or runway symbols:* When you see a large "X" in the center of an airport, that airport is closed! *Do not attempt a landing!* The same "X" on a runway means the runway is closed and dangerous to use. *Don't use it!* To give you an idea of what to look for, the lines that form the "X" are a minimum of three feet wide and 20 feet long.

● *Data list:* The CAA requires you to carry certain information in the airplane at all times. Other information must be maintained, but not necessarily carried in the aircraft. Here is the list:

● *To Be Carried At All Times:*

Aircraft Registration Certificate (Form ACA 500A)

Aircraft Airworthiness Certificate (CAA Form ACA 1362)

*(Continued on page 86)*

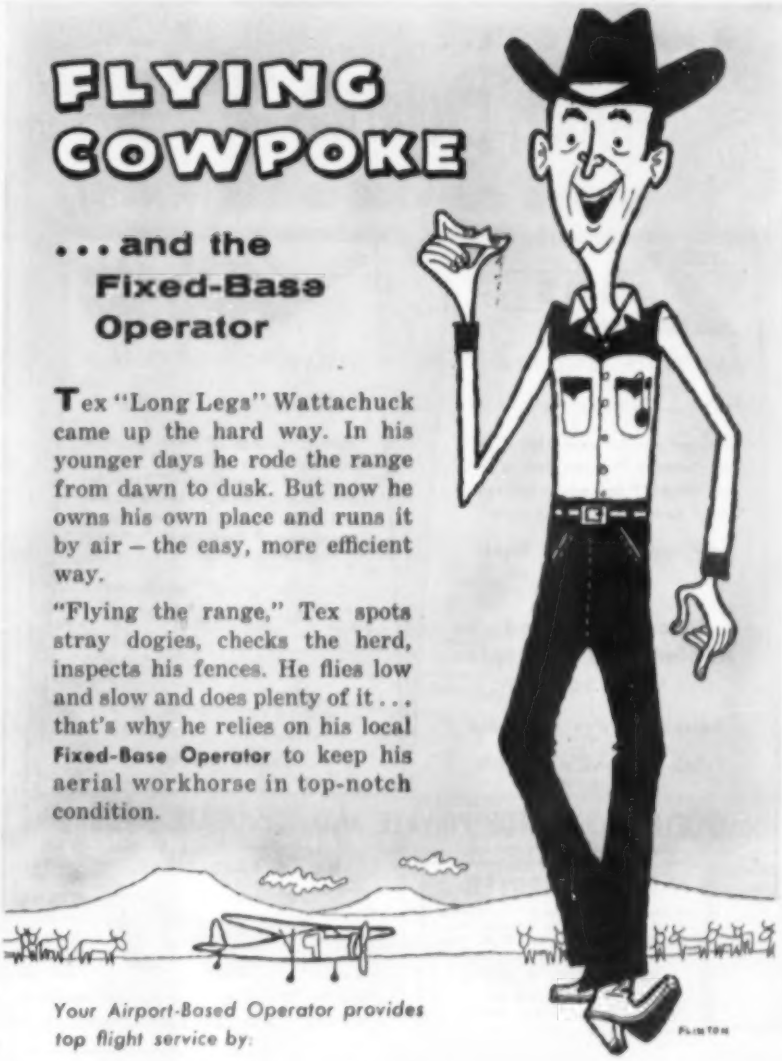



FLYING COWPOKE

...and the Fixed-Base Operator

Tex "Long Legs" Wattachuck came up the hard way. In his younger days he rode the range from dawn to dusk. But now he owns his own place and runs it by air – the easy, more efficient way.

"Flying the range," Tex spots stray dogies, checks the herd, inspects his fences. He flies low and slow and does plenty of it . . . that's why he relies on his local **Fixed-Base Operator** to keep his aerial workhorse in top-notch condition.



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*(Continued from page 85)*

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Airplane Radio Station License (if transmitter installed)
Airplane Log Book
Engine Log Book

● *To Be Maintained But Not Necessarily Carried:*

Weight and Balance Report or latest copy of the Repair and Alteration Form 337
Equipment List
Model Number
Registration Number
Factory Serial Number
Date of Manufacture
Engine Number
Key Numbers

Some pilots might feel that their experience places them beyond the necessity of collecting such basic facts of flying—that this is stuff "for the beginners."

We refer them to the CAA accident report for 1952: over 60 per cent of total fatalities were pilots between the ages of 25 and 39; almost 100 per cent more fatalities occurred in the 101 to 300 hour group than at any other experience level.

That's why this pilot figures he'll never get too good to carry his handbook. We recommend you do the same. END

## Spartan of Tulsa

*(Continued from page 24)*

school instructors and mechanics for 34 training planes. During the subsequent peak of student training, the number of planes at Spartan increased to 350, the number of employees from 30 to 2,000, and the student enrollment to over 1,700.

The Muskogee Branch of Spartan School was established in September, 1940. Within 40 days, six new buildings were constructed, and the school put into operation. Its cost of operation per student trained was lowest in the nation. Spartan's British Flight School No. 3 at Miami, Okla., commenced operations August 14, 1941.

During the war years, Spartan trained dozens of British and American pilots who went on to become aces. Three of the men on the Doolittle raid on Tokyo came out of the Tulsa School. And, while thousands of cadets were being trained, the Spartan aircraft plant was not idle.

At the beginning of the war, Spartan engineers had created a new training plane, the NP-1, which was approved by the Navy. Several hundred were built. Spartan also built wings for the Grumman *Wildcat* and sub-assemblies for Boeing, Consolidated, Curtiss-Wright, Douglas, Fairchild, Goodyear, Lockheed, Martin, North American, and Republic. Meanwhile, Bill Skelly, busy with many other enterprises, stepped down as president of the company in favor of J. Paul Getty, University of California and Oxford economics graduate of 1913, who had helped to develop the great Oklahoma oil fields, with Tulsa as his headquarters.

Under the aegis of Getty and Balfour, Spartan faced postwar aviation. It catered to veterans studying under the G.I. Bill, offering courses in its vari-

*(Continued on page 88)*

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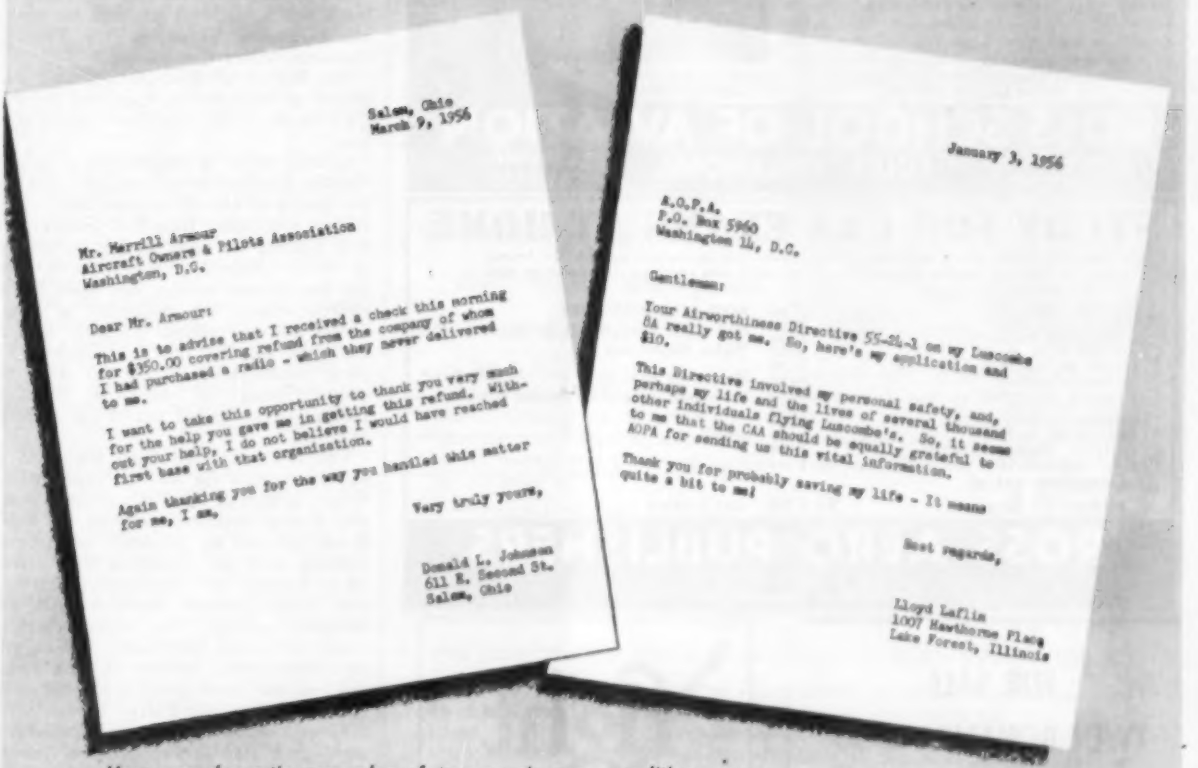

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March 9, 1956

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Again thanking you for the way you handled this matter for me, I am,

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January 3, 1956

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Thank you for probably saving my life - It means quite a bit to me!

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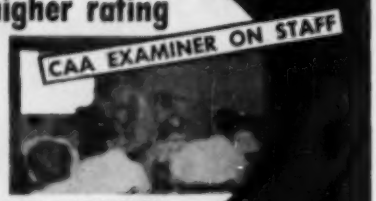


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MR. & MRS. ARTHUR R. OTIS
OTIS LODGE
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(Continued from page 86)

ous schools, approved or accredited as follows:

The College of Aeronautical Engineering, accredited by the Oklahoma State Regions for Higher Education.

The School of Flight and the School of Mechanics, both airplanes and engines, approved by the Civil Aeronautics Authority.

The School of Radio and Communications, which qualified students for operator's licenses issued by the Federal Communications Commission.

The School of Meteorology, and the School of Instruments, approved by the CAA as an official instrument repair station.

In addition to its educational program, Spartan developed an enviable place in the post-war aircraft service field, converting everything from B-17 bombers to P-47 fighters for such diverse customers as South American governments, the Air-Sea Rescue service, and even for a church group, the Assembly of God, which had a *Fortress* "pacified" into a transport called "The Ambassador" to carry missionaries to Africa. And, in another phase of enterprise, Spartan trailers began to roll out of the factory at Tulsa.

The Company had been too good a public servant for the government to forget, so part of the Tulsa school's post-war activity remained military. In 1951, it was selected for an Army instrument training program, extending from June, '51 to August, '53. Two hundred eighty-four Army aviators received CAA instrument ratings. The course concentrated on latest instrument techniques for liaison pilots. In June of 1950, Spartan had also been selected to train mechanics for the Air Force. Eleven hundred and seven maintenance mechanics were graduated in two years of operation. It originated and operated for 2½ years, the first known contract aircraft maintenance course for Army officers and has become since the war a big name in Army helicopter maintenance and instruction.

An auxiliary service division at Trenton, N. J., has been closed because of difficulties in operating "on two fronts," but Spartan has taken its large share of the private reconversion business — has its big overhaul plant going on all 36 cylinders with military contracts and civilian overhaul jobs; and is doing a land-office business training A&E mechanics and flight engineers. The latter get actual flight time in DC-6's by an arrangement between Spartan and Slick Airways.

The postwar Spartan "ideal" plane, the Model 12, a tricycle gear, five-place craft, keeps the old gang around Tulsa dreaming of the day when Spartan will again be a prime builder. Meanwhile, a big business with the Company is the hangaring and servicing of business airplanes.

Probably in the whole history of aviation no single enterprise has more successfully pursued more different phases of the Air Age or lent itself more readily to the ever changing and dynamic requirements of National Airpower, than has Spartan. END

## Low Cost Radar

*(Continued from page 27)*

approach pattern. The second component is known as the Precision Approach Radar. It controls only a narrow sector which is the approach path for the instrument runway. However, it gives the airplane's position in height as well as azimuth and range. Modern precision radars can position an airplane close to touchdown with an accuracy of plus or minus 20 feet.

For low traffic density airports, a surveillance radar is not necessary. As exampled in the first paragraph, an airplane can report over any fix such as an LF or VOR range station, or non-directional homing beacon. Then, by flying a specified heading for a few miles, the airplane will intercept the coverage area of the radar at which point the GCA controller will direct it in heading and altitude to the runway.

GCA has several major advantages. First, to conduct the radar approach, only a VHF receiver-transmitter is required in the airplane. Second, any competent instrument pilot can perform a radar approach without training; it is only necessary to follow the controller's instructions to fly headings and adjust the let-down rate until visual contact is established.

Under the sponsorship of the Bendix Aviation Corporation, SPAR Precision Approach Radar was taken through 14 countries of Western Europe. Twenty-four separate demonstrations were performed. The author was in charge of this project. Several extremely interesting points were highlighted.

Europe does not as yet have anywhere near the radar or other navigation aids that we have in the United States. Many pilots, especially military, have never been exposed to precision approach radar. Also, there is a corresponding lack of trained GCA ground personnel. Yet, wherever we went, Helsinki, Belgrade, Rome, Madrid, etc., the immediate results were superb.

SPAR was designed with a minimum number of knobs and switches. As a result, control tower personnel who had never seen a radar previously could sit down after five minutes of explanation and, in their own language, control approaches. Even their first attempts elicited compliments from the military and air line pilots who flew their own aircraft against the radar.

A striking sidelight is pointed up by the reliability performance of SPAR during the tour. The radar was transported over 6,000 miles of frequently bad roads in a truck and trailer combination. Only once in the 24 demonstrations did SPAR fail to operate when the "button was pushed."

Actually, SPAR does not represent anything new in the field of precision radar. Its main contribution is that its performance is as good as elaborate, more expensive radars but it has been pared down by careful engineering to the bare essentials; and it does not feature standby equipment. The result is a radar which, costing less than $45,000, can materially add to the utility of hundreds of airports around the world. END


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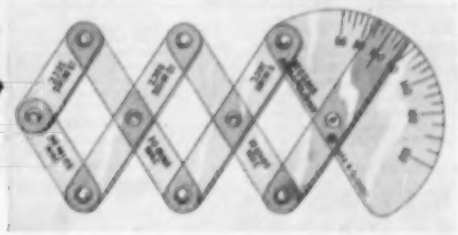

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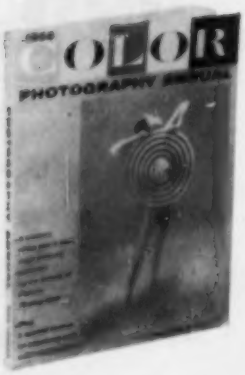


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## I Soared a Luscombe

*(Continued from page 31)*

mately 7, 860 feet so I knew air was going up everywhere now—even in between twisters.

As we entered this large thermal, it seemed even more turbulent than the others and we felt the Luscombe surge upward sharply. I looked at the altimeter and the hand was swinging upward madly between 800 to 1,000 fpm. I said to myself, "Sure don't need an engine now," and reached over and cut the switch. McCarty was looking out the window at the time, trying to locate Webber and his glider. The prop kept windmilling about 800 rpm. I pulled back till I had the stick to its limit of travel, kept the wings level with the rudder and at 40 mph, the prop finally stopped.

McCarty almost jumped out of his skin and yelled, "What did you cut the switch for—are we in trouble?" I tapped him on the shoulder and pointed to the altimeter. It was still climbing and read just 10,000 feet. After he calmed down, a big grin broke out on his face and no wonder. We were soaring and climbing an airplane with a dead engine at 800 to 1,000 fpm.

After the surprise wore off a little, we noted that the sky was full of large cumulus clouds and our twister seemed to slant upwards towards one of the heaviest clouds. Around and around we went, always staying in the core of the twister. It was starting to get cool now. Every


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once in a while when I happened to pick up speed to about 65 mph, the prop would start to windmill. I pulled back a little each time till it stopped.

We reached 12,000 feet and figured we were getting additional lift from the base of the big cloud, which I judged was around 19 to 20,000! At 14,000 feet, I looked down and marked that the twister in which we had been spiraling had disintegrated. Now we were being pulled up by the cloud alone. In a few minutes we were at 17,000 and the altimeter slowly stopped climbing and came to a standstill, neither gaining or losing. The lift had reached its peak for the Luscombe and I thought, "If I were in a glider now, I could go right up to the base of that cloud and penetrate it if I wished."

Now we were cloud hopping and could hold about 17,000 feet under the clouds but, as we hopped from one to another, we would lose one or two thousand feet in between. However, we always picked it up again under the cloud base which we still estimated was 19,000. With *full up elevator* trim, it took *both hands* to hold the nose up at 45 to 50 mph. The Luscombe just isn't designed for soaring at very low airspeeds with a dead engine.

We began to look for Webber and his glider. After a half hour search, we found him 15 miles east of the airport. He was cruising around at the same altitude we were. We sneaked up behind him and noticed he was flying about 55 mph and had his spoilers open. We surmised he was going to a lower altitude because of the cold, since he was flying the Bowlus with the hood off. We pulled up and overlapped his wing with ours. He looked around with the most surprised expression possible to a human face. There was his Luscombe soaring with a dead engine alongside him at 17,000 feet. For over a half hour we took movies and still pictures while Webber and I were dog fighting all over the sky. There seemed to be lift everywhere, but finally we saw Webber open his spoilers again and start diving towards the airport. The fun was over.

We had been without oxygen at 13 to 17,000 feet for over one and a half hours and I was starting to get dizzy spells. During two previous days of the glider contest, I had only about three hours sleep and the effects were starting to show. McCarty also was shaking his head and gulping air. He wore no shirt and I could see his knees shaking with the cold. Me, I loved it—the cold, I mean, after being downstairs in 113° temperature.

We were about 20 miles northeast of the airport at this time. I turned the switch on, cracked the throttle and dove to 90 mph. The Luscombe started promptly. I turned the switch off once more, stalled the ship till the prop stopped, and glided back to the airport. Although I have made thousands of deadstick landings in gliders, this was my first in a power ship. I eased her on and really surprised myself. Webber and the Bowlus had already landed and he and Gus Briegleb, owner of the Briegleb School of Soaring, were waiting for us. Webber had a grin from ear to ear. And why not? His Luscombe had just flown 2½ hours on less than two gallons of gas! END


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## Check Pilot Report on the Mooney Mark 20

*(Continued from page 35)*

reading between 2.5 to 3.5 psi. Flip switch *off* after engine starts. Engine driven fuel pump records on same gauge.

Mixture—*rich*. Brakes—*locked*. Magneto switch—*both*. Clear prop visually and verbally. Pump throttle to prime. Engage starter.

With the engine turning over, it seemed to me that the noise level in the cabin was a little higher than in some other four-place craft. Kucera commented that Mooney is planning to use a muffler and cowl flap combination on future models to replace the straight exhaust and augmenter combination used presently.

To taxi, a slight increase of power will start the *Mark 20* moving. Its steerable nose wheel permits ease of control on the ground. Visibility is excellent while taxiing. The nose slopes away from the windshield, giving the pilot a good view forward and downward. Side windows, being of generous size, practically eliminate blind spots.

Once in position for take-off, trim is checked for proper indication. Flaps are lowered to first position if desired and mags are checked at 1,500 rpm. At this time carburetor heat is checked and returned to *off* position unless icing conditions exist. Next, the prop pitch change is checked and pushed to the full forward position. Throttle is applied full to the panel and the *Mark 20* is on its way.

The airplane accelerates rapidly and within seconds the nose can be lightened. As the airspeed builds past 60 mph, the plane will break ground sooner if a moderate tug is made on the control wheel, rather than following the conventional practice of holding back pressure.

Once off the ground, the nose is leveled to pick up speed. Raising the gear is accomplished by a firm pull of the lever which manually retracts the spring loaded undercarriage. Climbing airspeed is set up for 90 mph (minimum speed for cooling) as prop pitch is adjusted to get the tach needle to drop from around 2,700 rpm to 2,500, followed by the throttle backed off to 25 inches manifold pressure.

With such a power setting, the Mooney took the three persons aboard into the blue at a rate of 950 fpm. This was with the main tanks full, an outside temperature of 42° F. and only a 6 to 8 mph wind.

Kucera reports that when operating from shorter strips, he can climb out at 70 mph indicated (with the same load) and get a good rate of climb. This is supported by my experience where, with plenty of altitude, I lifted the ship at 60 mph in gentle climbing turns and observed good aileron control at that speed. With gear and flaps down, power off, the *Mark 20's* nose fell through at about 55 mph. With the wheel held back there was a noticeable rate of sink and aileron control was positive throughout the stall.

Especially impressive is the recovery

from a stall with cruise power on, flaps and gear up. As the nose is pulled up gently, there is a lively rate of climb. At 60 mph the stall horn toots and at 50 mph indicated the nose begins to drop. At this point, if the control wheel is pushed forward just slightly, the Mooney instantly flies itself out of the stall.

In trimming the airplane for cruise, I found that it expedited the attitude if the nose was dropped for a few seconds before adjusting trim. For example, if I leveled off after the climb to cruising altitude, the airspeed stayed near 140 mph. However, a slight dip of the nose and the airspeed went up to 160, and continued to hold that speed as I leveled off and trimmed. This characteristic, I believe, is due to the modified laminar flow wing and parallels behavior of some military aircraft which use the design.

When trimmed for cruise the Mooney scooted along. In a full throttle run at 1,000 feet altitude, the engine churned up 2,700 rpm (100 per cent), and the airspeed showed 170 mph. Climbing to 2,000 feet, I tried the 75 per cent power setting (2,450 rpm), and the indicated air speed was 162 mph. At this altitude, I set the pitch control for 2,300 rpm and varied the manifold pressure with the throttle. At 23 inches, the speed was 155 mph; at 22 inches, 142 mph; at 20 inches, 136 mph.

The next check I made was to see whether or not the *Mark 20* lost speed excessively in a tight turn. I had heard that this was an undesirable quirk of the airplane. To determine this, I first

*(Continued on page 94)*


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*(Continued from page 93)*

trimmed up for cruise at 160 mph and then lowered the left wing as I started a steep 720°. By the time 360° was completed, the speed had dropped to 130 mph; at the 720° point, it was 120 mph.

At first this did seem excessive. However, when you compare it to the behavior of other high performance lightplanes, it is only slightly pronounced. Take, for example, Kucera's Cessna 195. Going into a steep 720° at 160 mph, the speed drops to 140 mph at the 360° point, and then to 130 mph at the 720° point.

The Mooney had good handling characteristics at reduced speeds, preparatory to landing. Maximum speed for operation of the gear is 120 mph, so the first step is to slow down the airplane by reducing power. Once under 120 mph, the gear control is moved to the *down* and *locked* position and the spring-loaded gear comes down swiftly and positively. Its induced drag is effective and quickly drops the airspeed to about 90 mph—within the airspeed range where the flaps can be lowered.

When lowering flaps, as when the gear came down, a little adjustment is needed to trim off the nose-down tendency. The airplane then holds altitude well at 90 mph and a normal pattern is flown.

On the final, full flap is applied and a glide of 80 mph is recommended. Passing over the fence, the airplane is slowed to 70 mph and this is held until the flare-out at about three feet above the runway. At this point I held the *Mark 20* in level attitude and it began to settle softly through the ground cushion. The main gear touched lightly and stuck to the hard surface.

To complete the landing, I applied a little forward pressure to put the normal load on the steerable front wheel and had the Mooney under control all the way. This was one of the easiest landings I have ever experienced in a high performance lightplane.

The Mooney *Mark 20* really is an easy airplane to fly. After putting it through its paces and touching down, I felt that warm feeling of satisfaction that manifests itself upon completing an enjoyable flight in an exceptional airplane of its class. END

## MOONEY MARK 20

### Manufacturer's Specifications

### Weights

| | | | |
|---|---|---|---|
| Gross Weight | 2,450 lbs. | Max. baggage (with four 170-lb. occupants) | 120 lbs. |
| Empty Weight | 1,415 lbs. | Fuel (50 U. S. gallons) | 300 lbs. |
| Useful Load | 1,035 lbs. | Oil (2 U. S. gallons) | 15 lbs. |
| Available weight for people and baggage | 800 lbs. | | |

### Performance (Maximum Gross Weight)

| | | | |
|---|---|---|---|
| Max. Cruising Speed 7,000 ft., 75% power 2450 rpm, 22.7" Hg. | 170 mph | Range at Economy Cruise 7,000 ft. | 1,000 miles 6.7 hrs. |
| Economy Cruising Speed 7,000 ft., 60% power 2300 rpm, 20.5" Hg. | 150 mph | Top Speed (Sea Level) | 175 mph |
| Range of Optimum Cruise 7,000 ft. | 890 miles 5.4 hrs. | Rate of Climb (at Sea Level) | over 900 fpm |
| | | Service Ceiling | over 17,200 ft. |
| | | Absolute Ceiling | over 20,000 ft. |
| | | Landing Speed | 57 mph. |

**Price: $12,500 FAF (incl. constant-speed prop and primary instruments)**

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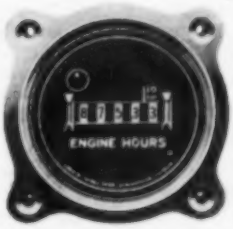

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# Briefings . . .

(Continued from page 12)

delivery of a 1956 *Tri-Pacer*. In their mid-fifties, the Joneses view flying as a new world of pleasure and adventure. Owner of a washing machine business, Mr. Jones plans also to use his plane for business.

LATEST IN THE WELL-KNOWN SERIES of Warner aircraft navigational aids is the E-1 Computer. There are no limitations on wind, air or ground speeds, and the E-1 solves navigational problems as a computer, protractor, wind vector computer, pressure pattern computer or runway indicator. Sold for $6 through regular aircraft navigational aid outlets, a free booklet is available by writing Warner Instrument and Sales Co., 4734 N. Austin, Chicago, Ill.

AN EIGHT PAGE LEAFLET describing construction details and features of the new 4-place Taylorcraft *Fiberglas* airplane is available from Taylorcraft Inc., at Conway, Pa. Performance specifications and other details are included, as well as the company's method of joining fiberglas skin to a welded steel tubing.

THE CURTISS-WRIGHT CORP. has released pictures and details of its powerful ramjet engine. Said to be the first successfully controlled ramjet — it can be throttled up and down by the pilot—it is at present providing power for the Bell X-2 supersonic experimental plane which is designed to probe the thermal barrier.

CERTAINLY ONE OF THE YOUNGEST pilots ever to hold an instrument rating is 17-year-old Gary Wright of East Point, Ga. Part owner of a Luscombe plane, which he helped to buy at the age of 15

years by delivering newspapers, he was granted his instrument rating personally by L. J. Mecure, CAA District Safety office superviser (left) as his father, Captain K. D. Wright of Delta Airlines, beams proudly.

IN PROSPECT FOR long range racing pilots are two International speed races scheduled for the 12th to the 22nd of September. One race is from the U.S.A. to England, thence to Johannesburg, So. Africa. The second, England to Johannesburg. Total prize money 75,000 Pounds, British, or approximately $210,000. Closing date for entry, August 13. Full details from the Royal Aero Club, London, or National Aeronautic Association, Washington, D.C.

HELIO'S 1956 MODEL of the *Courier*, with an increased speed of ten miles and range to 745 miles, is in production at the corporation's facilities at Pittsburg, Kan. With numerous refinements this model cruises at 167 mph with 70 per cent power at 8,500 feet. Since setting up assembly-line production in the Mid-State Manufacturing Co. plant last August, Helio has delivered 28 of its 4-place "STOL" executive-utility *Couriers*.

TO INDUCE PILOTS voluntarily to report in-flight incidents where near mid-air collisions occur between aircraft, the CAB has inaugurated a system whereby the pilot may report such events without fear of disciplinary action, even if violation of Civil Air Regulations is disclosed. CAR bulletin SR-416 gives full details.

MAJOR JOHN J. KROPENICK, posing on the wing of this Republic F-84F *Thunderstreak*, is holder of a record that few will dispute. This USAF pilot has just completed his 4,000th hour of jet

flying, an equivalent of 80 times around the earth, figured in jet time. He is commanding officer of the 55th Fighter Bomber Squadron in England.

GROUND OBSERVER CORPS members in the Midwest demonstrated once more how the GOC system can pay off in emergencies outside of National Defense. During the recent rash of tornados which broke out from Texas north to Michigan, in at least two instances GOC volunteers alerted communities in their area to the approaching twister in time for many persons to reach shelter.

WHEN AN AIRFREIGHTER of Seaboard and Western Airlines recently touched down at Idlewild International Airport, New York, wide-eyed airport officials took a second look at its cargo. Included among other things were a Himalayan Panda, two orangutans from Indonesia, a rare clouded leopard from Java, a tapir (anteater) from Siam, five cages of Javanese temple birds, two cages of India's Malabar squirrels, two silver gibbons from Singapore, a fishing otter from India, 289 rhesus monkeys, and 13 dogs of various breeds.

OPENING A NEW ERA in hotel service and making midwest aviation history, the Hotel Sherman in Chicago has inaugurated helicoptor service from its own heliport atop a penthouse on its 18th floor. Airman Arthur Godfrey made the inaugural flight in a Bell 47-G helicopter and was greeted on arrival at the Sher-

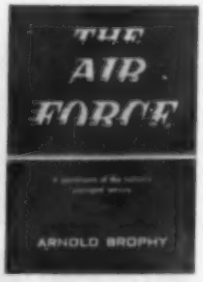
man's rooftop by (l to r) a porter; Gene Barrett, V.P. and General Manager of the Sherman; Patrick H. Hoy, president; Larry Bell, president of Bell Aircraft; Alfred Cilella, representing the mayor of Chicago, Admiral Dan Gallery, USN and barely visible, Frank Bering, Chairman of the Board of the hotel.

IF THERE IS ANY DOUBT in your mind as to whether or not you should make an ADIZ report, be smart—make it. That is the caution given by an airline to all of its pilots, going on to emphasize that interceptions by jets are not only costly but dangerous for all concerned.

APPOINTED EASTERN DISTRIBUTOR for the Winslow Full Flow oil filter, Airwork Corp. of Millville, N. J., is offering a brochure on this product. Installed, the filter weighs 10 lbs. and is said to remove two and one half pounds of solids from lubricating oil in 100 hours of normal operations. At present approved for DC-3 and *Lodestar* engine installation, approval for lighter-twin-engine application is expected in the near future.

HARMON TROPHY WINNER, J. F. "Skeets" Coleman, noted test pilot and the first man to fly a vertical takeoff aircraft has joined the Fairchild Engine and Airplane Corp. as a member of the Customer Relations Staff. In 1954 he flew Convair's XFY *Pogo* VTO turboprop fighter.

MORE THAN A RUN OF THE MILL word picture of the U.S. Air Force, Arnold Brophy's "The Air Force" is a comprehensive coverage of our airborne defense arm—how it was born, how it grew up and what it is today. This book should be invaluable as a ready reference for Air Force personnel as well as the young man today who is thinking about a career in this Service. Publishers: Gilbert Press, distributed by Jules Messner, Inc., New York. Price $5.



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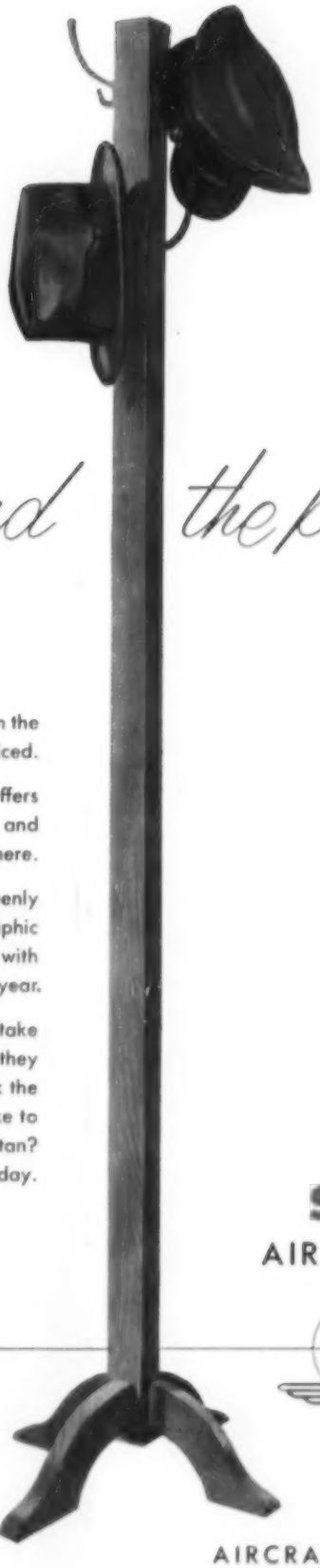

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